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ABSTRACT

This volume contains the proceedings of a conference held to acquaint managers and health care professionals with new developments in the field of occupational stress. Psychological stress research performed by the National Institute for Occupational Safety and Health (NIOSH) from 1971 to 1976 is reviewed first, with an emphasis on defining high-risk work groups and isolating specific sources of stress in the work environment which may influence worker health. Other presentations include an examination of the relationships between coronary heart disease and machine-pacing with occupational stress; a discussion of the rise of worker compensation claims based on cumulative injury, which includes stress-related diseases; discussions of issues bearing upon the establishment of work-based programs to deal more effectively with occupational stress/strain, including the necessary steps to be taken by a consultant in setting up a corporate stress awareness program; and a description of an active, in-house employee assistance program amenable to including stress management. Both a socio-technical approach to dealing with stress in large organizations and a union-management collaborative program on occupational health are described. Finally, specific topics which merit attention are outlined in the concluding remarks. (Author/KC)

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# NEW DEVELOPMENTS IN OCCUPATIONAL STRESS

Proceedings of a Conference
Held in Los Angeles, California 13 November 1978

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## ABSTRACT

This volume contains the proceedings of a conference held to acquaint managers and health care professionals with new developments in the field of occupational stress. Approximately 250 individuals attended the one-day conference.

Psychological stress research performed by the National Institute for Occupational Safety and Health (NIOSH) from 1971 to 1976 is reviewed first, with an emphasis on defining high-risk work groups and isolating specific sources of stress in the work environment which may influence worker health. Other presentations include an examination of the relationships between coronary heart disease and machine-pacing with occupational stress; a discussion of the rise of worker compensation claims based on cumulative injury, which includes stress-related diseases; discussions of issues bearing upon the establishment of work-based programs to deal more effectively with occupational stress/strain, including the necessary steps to be taken by a consultant in setting up a corporate stress awareness program; and a description of an active, in-house employee assistance program amenable to including stress management.

Both a socio-technical approach to dealing with stress in large organizations and a union-management collaborative program on occupational health are described. Finally, specific topics which merit attention are outlined in the concluding remarks.



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# INTRODUCTION

The rising incidence of stress-related disorders has generated considerable research interest in occupational stress and in efforts aimed at alleviating such disorders. The National Institute for Occupational Safety and Health (NIOSH), in order to examine the relationship between job stress and worker health, has sponsored meetings and conferences to bring up-to-date research findings to public attention. This conference, held in November, 1978, is one of those activities.

Attempts are made to define stressors--those elements in the work environment which generate distress in the workers. Psychosocial factors are emerging as important sources of stress which can influence worker health and well-being. The complex interaction between work and life stress and the effects of personality traits on stress reactions are a few of the diverse areas being investigated. Factors which serve to "buffer" the individual against stress (e.g., biofeedback, relaxation) are also being investigated.

While stress-management or stress-reduction programs are being implemented at an ever increasing rate, there exists a gulf between the professional/practitioner and the scientist/researcher. This is due in part to a lack of "cross-talk" between these groups that hinders the translation of research findings into applied therapies and programs.

In order to help bridge the gap between research and application, the Institute of Industrial Relations at UCLA conducted this conference on November 13, 1978, with the co-sponsorship of NIOSH. The conference provided a forum for researchers and practitioners to interact and present respective viewpoints. The presentations were recorded and are presented in this volume, some as they were transcribed (after author review) and others as formal papers received from the authors after the conference. It is hoped that these proceedings will promote greater awareness and understanding of occupational stress and the methods being developed to deal with it.

# A REVIEW OF THE PSYCHOLOGICAL STRESS RESEARCH

# CARRIED OUT BY NIOSH, 1971 to 1976

Michael J. Smith, Ph.D.
Michael J. Colligan, Ph.D.
Joseph J. Hurrell, Jr., M.S.

## INTRODUCTION

From its inception, NIOSH has carried out a concerted research effort to examine the role of behavioral or psychological factors in the occurrence of occupational injuries and illnesses. One major component of this program dealt with the health consequences (both physical and mental) of occupational stress. This research has taken two major thrusts. The first has been broad-based surveys seeking to define specific groups of workers at greatest risk of suffering from high levels of job stress and strain and the job demands that produce stress problems. The second thrust has been more focused, concentrating on select high stress occupations and specific stress-producing work conditions to characterize their potential health consequences.

Both the general and focal studies have utilized health record evaluation as well as questionnaire and interview techniques to define stress problems. Because of their in-depth nature, the focal studies have delved much deeper into specific stress-producing work conditions and aspects of worker health than the more general information studies. The intent of this paper is to highlight NIOSH research exemplifying these two approaches.

## GENERAL STUDIES

The first NIOSH research study dealing with identifying high stress-risk individuals and stressful job elements was a cooperative effort with the Institute for Social Research at the University of Michigan performed in 1972.

The study was co-sponsored by the U.S. Department of Labor, Employment Standards Administration. Approximately 1,500 American families, whose employed members represented a national probability sample, were surveyed utilizing a structured interview procedure. Many aspects of the individual's working life were evaluated. Aspects such as satisfaction with pay level, amount of sick leave used per year, and relations with supervisors were included. Also included in the survey were items concerning job stress and employee safety and health. There were 12 different occupational groups studied, covering a range of white and blue collar jobs.

The results indicated that the following outcomes were related to job stress level: job satisfaction, life satisfaction, motivation to work, intention to leave job, absenteeism, overall physical health, self-esteem, depressed mood, and escapist drinking. One stressor, non-participation, appeared to be of special significance, correlating highest among all of the stressors with eight strain measures. Responses to the job stress and strain questions varied considerably across occupations. Professional and technical workers and managers scored highest in perceived job satisfaction but also showed high

levels of depressed mood. Machine operators scored lowest for job satisfaction and low in perceived health, but scored the best of any group on the mental health measures. Laborers showed the second worst job satisfaction level, but perceived their health as good and scored well on mental health measures. Overall, white collar workers showed much greater job satisfaction than blue collar workers although they showed slightly higher depressed mood and slightly poorer perceived health.

A second major study, dealing with defining high risk occupations and evaluating the impact of particular stressors, was also conducted for NIOSH by the Institute for Social Research at the University of Michigan. Entitled "Job Demands and Worker Health," this project went further than the previous one in that it examined 23 occupational groups and conducted a more expansive examination of job stressors and their role in producing job stress and strain. Over 2,000 workers were surveyed via questionnaire. As with the previous study, the results indicated strong occupational differences in stress/strain levels. Specific stressors such as low utilization of abilities, lack of participation, low work complexity, responsibility for persons, and role ambiguity were high for assembly line workers, fork-lift drivers, and machine operators; but very low for professors, family physicians, and other professionals. Machine-paced assembly-line workers scored high on boredom and dissatisfaction with workload. The most satisfied occupational groups were family physicians, professors, and white collar supervisors. Overall, assemblers and relief workers on machine-paced assembly lines had the highest level of stress/strain.

The most significant stressors reported by the study participants were difficulties with job complexity (too little for blue collar, too much for professional) utilization of abilities (underutilization for blue collar, overutilization for professionals), and responsibility for persons, which was most troublesome for first level supervisors and air traffic controllers. In addition to these stressors, blue collar workers complained of job dissatisfaction, boredom, and dissatisfaction with workload.

The third and final study in this program area was a records evaluation of over 22,000 cases of stress-related health disorders in 130 occupations in the state of Tennessee. This study is described in detail in the proceedings of last year's UCLA stress conference, and, therefore, it will only be summarized. The results of evaluating the health disorders case data indicated that 40 of the 130 occupations had a stress-related disease prevalence significantly higher than expected. Of these 40 occupations, 12 had very high prevalence rates. These were laborers (general and construction), secretaries, inspectors (assembly-line), clinical laboratory technicians, office managers, managers/administrators, foremen, waitresses/waiters, machine operators, mine machine operators, farm owners, and house painters. There were 77 occupations that showed expected stress disease prevalence and 13 occupations that showed significantly lower-than-expected stress disease prevalence. The 13 lower-than-expected occupations included sewer workers, checkers/examiners, stockhandlers, freight handlers, craftsmen, maids, farm laborers, heavy equipment operators, child care workers, packers/ wrappers, college professors, personnel/labor relations workers, and auctioneers/hucksters.

The three studies just described have made important contributions to the overall study of occupational stress. First, they are significant because they represent the only unified effort by a research group to compare stress/strain levels over a wide range of occupations. Second, they have been instrumental in defining, verifying, and elaborating critical workplace factors related to stress such as machine pacing, lack of control, poor supervisory relations, and lack of social support. Finally, they have identified many high-risk occupational groups suffering from job-related stress and strain that are worthy of in-depth evaluation.

## FOCAL EVALUATIONS OF STRESS PRODUCING CONDITIONS

As already noted, the second major thrust initiated by the NIOSH stress program has been to examine in detail particular high-stress occupations or significant job stressors. In this regard, specific occupations, such as police and coal miners, have been examined, as have individual stressors such as shiftwork and machine pacing.

### Job Specific Stress Problems

The first high risk group to be evaluated by NIOSH was policemen. A study was initiated in 1972 to examine a sample of police officers and administrators on the Cincinnati, Ohio, police force. In this study 100 police officers and 20 administrators from the approximately 1,100-person police force were given in-depth interviews about their work conditions and health problems. Interviews of police officers were conducted in the officer's police car while on duty. If an emergency came up, the interview was stopped until the officer was free to continue. Each interview (without interruptions) took about 45 minutes. A semi-structured interview format was used in which open-ended questions were asked. The officer answered these questions; then, based on the responses, in-depth follow-up questions were asked.

Results of the police officers' interviews indicated that the most significant stressors were adverse court interactions, negative public reactions, and lack of appropriate equipment. These types of stressors were more significant and more often emphasized than were direct life-threatening situations. Taken as a whole, the officers believed that their professionalism in law enforcement matters was at stake.

Police administrators were interviewed in their offices at district or department headquarters. The interview was similar to that of the officer except that administrative burdens were given more emphasis. The results indicated that the most significant problem for police administrators was the "man-in-the-middle" phenomenon produced by conflicting demands from superiors, subordinates, and the community. This problem was reported as having a number of negative effects on the administrator's family and home life.

Based on the results of these first police evaluations, a major study was initiated in cooperation with the Police Foundation and the International Conference of Police Associations to define stress problems in a nationally representative sample of police officers and administrators. This study surveyed over 2,200 police officers from 29 separate departments spread across

the country, utilizing a stress questionnaire that examined 40 stressors as well as possible health effects.

The data are still being analyzed and, therefore, what is presented here is only preliminary. The preliminary results for just the police officers indicate that boredom, role conflict, and job future ambiguity correlate highly with health complaints and self-reported physical health status. Furthermore, the results show that police officers have a divorce rate which is more than twice the national average. More complete results from this study will be available in a report which is nearing completion.

A second group of workers which we have examined is coal miners. Stress problems for coal miners were evaluated as an adjunct to a larger study aimed at examining factors which motivated the use of safe procedures and personal protective equipment by coal miners. Approximately 486 coal miners from 29 mines distributed across the 9 major coal-producing states were surveyed by a questionnaire. In addition, family members of a sample of the survey respondents were interviewed. The results were compared with the findings for blue collar workers in the earlier study entitled "Job Demands and Worker Health." It was found that miners generally fared better than other blue collar workers in various measures of job stress. They reported more participation, more utilization of skills, a less variable workload, and greater equity in wages. However, miners did show higher levels of mental strain (anxiety, depression, irritation) than did workers in the other blue collar occupations.

High Risk Stressors

A major area of our stress program deals with evaluations of high risk job stressors--those conditions that have the greatest potential for producing job stress and adverse health consequences. This has developed mainly from our previously described work in identifying high-risk work groups. The purpose of this research effort is to evaluate the significance, in terms of worker health, of general stressors that affect large numbers of workers. To date we have examined two such stressors--shiftwork and machine pacing. Dr. Murphy will present an in-depth look at our current results dealing with machine pacing in a separate paper.

In a recent NIOSH-sponsored study conducted by the Stanford Research Institute (SRI), it was determined that approximately one out of every four employees does not work a regular day (morning to evening) shift. The type of shift worked varies considerably in terms of starting and ending times, and there are also variations between fixed and rotating schedules. However, the majority of shiftworkers fall into the fixed afternoon, fixed night, or rotating (morning, night, afternoon) categories. NIOSH, in conjunction with SRI, carried out an evaluation of the health and safety effects of the aforementioned shift schedules in two work groups--nurses and food processors.

This study combined a questionnaire survey with a health and safety records evaluation of over 1,200 nurses and 1,200 food processors distributed across the country. The questionnaire survey examined worker perceptions of job conditions and stress factors, as well as specific shift matters related to life styles, family problems, coping patterns, and health complaints. The

health and safety records evaluation examined dispensary logs, OSHA 100 logs, and personnel records to compile health and safety information.

The results of the study indicated that the nurses and food processors working rotating shifts had significantly more dispensary visits and recordable accidents (almost twice as many) than did those workers on fixed shifts. Workers on day shifts had the least health and safety problems, followed by fixed afternoon and evening shift workers.

In terms of job stress and strain, the rotating shift workers showed a significantly higher incidence of the following problems than did fixed shift workers:

--Digestive trouble
--Chest pains
--Wheezing
--Nervousness
--Inadequate sleep patterns
--Colds
--Fatigue
--Leg and foot cramps
--Less satsifactory domestic and social life
--Alcohol consumption
--Use of stimulants
--Use of sleep-enhancing medications.

The results of the study support the view that there is a tendency for shiftwork (in particular, rotating shiftwork) to have a deleterious effect on the physical and psychological well-being of a significant number of shift workers. These effects include disturbance of sleep patterns, digestion problems, mood disorders, and negative impact on personal, social, and domestic activities. The effects become more severe with departures from the conventional daytime work schedule.

HEALTH PROBLEMS OF PSYCHOGENIC ORIGIN

The final research area to be addressed deals with our in-depth examinations of psychogenic illness related to job stress. There are two studies in this area. One examines the relationship between specific job stressors and coronary heart disease. Dr. Chadwick will be giving a detailed description of this research in a separate paper. The second study deals with evaluations of mass psychogenic illness (assembly line hysteria) in industry. Since 1974, we have participated in evaluating eight plants where such outbreaks have occurred. These outbreaks are typified by a number of workers becoming simultaneously ill, displaying symptoms such as dizziness, weakness, breathing difficulties, vomiting, and fainting. These symptoms are indicative of toxic poisoning and produce a great deal of apprehension in the workers affected, as well as in their unaffected coworkers. When such incidents occur, the Occupational Safety and Health Administration (OSHA) and/or NIOSH will be notified. NIOSH gets involved when a request for assistance comes from OSHA, the employer, or the union (or employee representative).

The first action that NIOSH takes is to determine if a toxic agent is present that could have produced the outbreak. If no such agent is identified, then a biomedical evaluation team is asked to evaluate the working conditions and the employees to determine if the outbreak could have had a psychogenic component. These evaluations entail an examination of medical records and employee symptoms, employee psychological status, job stressors, life stressors and home problems, and sociometric interactions.

The results of the biomedical evaluations from the first five plants examined revealed the following:

--In general, mass psychogenic illness occurs in predominately female workforces and affects primarily women.

--Those persons affected are experiencing high levels of job stress. Worker complaints center around work pace, poor supervisory relations, lack of social support, boredom, role ambiguity, and a poor physical work environment (noisy, poor lighting).

--Problems of work interfering with family responsibilities are a major difficulty for the women affected. For instance, overtime was often required at the time the outbreaks occurred. The affected women complained that such overtime took away from the little time they had to fulfill their home and family responsibilities.

--The outbreak is usually triggered by a physical stimulus, for example, an odor.

These results are far from complete. We will have to evaluate many more of these outbreaks in order to get reliable, generalizable trends. Future efforts in this area will include not only the evaluations of additional outbreaks, but also the development of intervention strategies to deal with such outbreaks when they occur.

CONCLUSION

The intent of this report has been to summarize the work of NIOSH in examining occupational stress from 1971 through 1976. As you can see, there have been two major areas of concern--one aimed at defining high-risk groups and select job stressors; another aimed at keying in on the particular stress problems encountered by specific high-risk groups. The former endeavor encompassed the major work done by NIOSH for the first four years of the stress program and has established a base upon which to build the latter work. Current emphasis is on examining particular stressors that affect a wide variety of work groups, and in defining critical elements responsible for worker ill health. Such studies will form the basis of developing methods and programs for eliminating or reducing worker stress.

In addition to the studies described above, NIOSH has sponsored a number of conferences (some of an international nature) that bring together experts on various aspects of job stress to present state-of-the-art information as it is

being developed. As you know, there is always a considerable time lag between completing a research study and getting the results into print. Even then it may be years before the results of such research become common public knowledge and are applied in a pertinent fashion. The purpose of the NIOSH conferences has been to bring pertinent current stress knowledge to public view in a timely fashion so that new developments can be utilized as soon as possible. NIOSH-sponsored conferences have included:

1. General Stress Conference Cornell Medical Center 1972
2. Conference on Shiftwork Health Effects NIOSH 1975
3. Conference on Job Stress and the Police Officer NIOSH 1975
4. Conference on Reducing Occupational Stress Cornell Center 1977
5. Conference on Occupational Stress UCLA 1977
6. The current conference (New Developments in Occupational Stress UCLA 1978).

I have given very brief overviews of a number of our completed studies. There are a great number of important aspects of the findings from each study that could not be covered here. Reports on almost all of the studies covered are available from NIOSH, and I urge you to write to obtain copies.

LIST OF SELECT NIOSH PUBLISHED REPORTS ON

OCCUPATIONAL STRESS


Althouse, R. and Hurrell, J. 1977. An Analysis of Job Stress in Coal Mining. DHEW (NIOSH) Publication No. 77-217.

Caplan, R., Cobb, S., French, J., Van Harrison, R. and Pinneau, S. 1975. Job Demand and Worker Health. DHEW (NIOSH) Publication No. 75-160.

Colligan, M., Smith, M. and Hurrell, J. 1977. Occupational incidence rates of mental health disorders. Journal of Human Stress 3:34-39.

Colligan, M. and Smith, M. 1978. A Methodological Approach for Evaluating Outbreaks of Mass Psychogenic Illness in Industry. Journal of Occupational Medicine 20:400-402.

Kroes, W., Margolis, B. and Hurrell, J. 1974. Job stress in policemen. Journal of Police Science and Administration 2:145-155.

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Quinn, R. and Shepard, L. 1974. The 1972-73 Quality of Employment Survey. Survey Research Center, University of Michigan, Ann Arbor.

Smith, M., Colligan, M. and Hurrell, J. 1978. A review of NIOSH psychological stress research--1977. Proceedings of Occupational Stress Conference. DHEW (NIOSH) Publication No. 78156.

Smith, M., Colligan, M. and Hurrell, J. 1978. Three incidents of industrial mass psychogenic illness. Journal of Occupational Medicine 20:399-400.

Tasto, D. and Colligan, M. 1978. Health Consequences of Shiftwork. DHEW (NIOSH) Publication No. 78-154.

# MACHINE PACING AND OCCUPATIONAL STRESS

Lawrence R. Murphy, Ph.D., and Joseph J. Hurrell, Jr., M.A.

This paper addresses two questions:

1. Are machine-paced job operations inherently stressful to the worker?

2. Is the stress arising from machine-paced work sufficiently great to place workers at a higher-than-normal risk for health disorders?

Past research cited in the literature and current projects being conducted or supported by the National Institute for Occupational Safety and Health (NIOSH) are reviewed here which bear on answers to these questions.

At the outset, it is important to note that the majority of studies concerned with aspects of machine-paced tasks have been primarily directed to performance and work capacity considerations. In this regard, measures of interest have included production output, error rates, and indices of energy expenditure such as oxygen consumption rate (Wyatt and Langdon 1938; Conrad 1954; Corlett and Mahadeva 1970; Salvendy and Piltsis 1971). Fewer investigations have been made into the psychological problems or health consequences connected with forced paced-work routines. In fact, aside from a recent Swedish study on machine pacing and health, there exists no systematic investigation of such problems. The following excerpt from this Swedish study describes the rationale for viewing machine-paced work as stressful with potential health consequences:

> The social psychological approach is based on the assumption that challenge and pride in work are fundamental ego-needs, and that any serious threat to these needs will endanger the individual's total wellbeing. Critical factors are those which circumscribe the individual's ability to control his own work and assess his work role in relation to a meaningful whole, as well as factors which limit his opportunities for cooperation and fellowship with others. Among specific job characteristics which have been identified as particularly threatening, some are associated with underload, others with overload.
>
> Examples of the former category are mechanically controlled work pace, standardized motion patterns, constant repetition of short-cycle operations, and lack of opportunities for social interaction in the course of work. Examples of the latter include piece-rate rush and high demands on superficial attention. It should be noted that these characteristics of underand overload tend to occur in the same work situation. For example, workers engaged in repetitive, machinepaced tasks may be required to make skilled judgements at short intervals. Such a combination of monotony and pressure, typical of work on the assembly line, exposes the worker to a heavy total load. (Frankenhauser and Gardell 1976, p. 36.)

## WHAT IS MACHINE PACING?

At first glance, the concept of machine pacing seems straightforward. It is a work condition in which the speed or pace of the operation and the work output are controlled to some extent by a source other than the operator. This differs from selfpaced operations where the output, rate, and speed of the task being performed are under the continuous control of the operator. In reality, there exists a continuum between the extremes of operator control along which specific work operations may fall.

Conrad (1954) was perhaps the first to call attention to the important fact that there are different types of pacing. He identified two types, which he called "rigid systems" and "systems with margins." Dudley (1962) describes the distinction between these two types of pacing as follows:

> In an extreme case, the operative may be rigidly paced by a machine, in that the time allowed to perform the operation is equal to the time required for its completion and every article or component must be dealt with. In other cases, a few misses may be allowed, a few faults tolerated, or a little waiting time introduced. Alternatively, the work itself may be allowed to accumulate at the work station to permit some degree of flexibility on the part of the operative.

Murrell (1963) described two slightly different types of pacing, which he referred to as Type 1 and Type 2 pacing. In Type 1 pacing there is a time period in which some operation must be carried out; little or no work is performed by the operative while the machine is indexing or processing the part. This type typically occurs in situations where workers perform tasks which support machine functioning, e.g., feeding machines, removing processed parts.

In Type 2 pacing, work is performed during the period that the machine indexes and must be completed at the time that the machine is ready to be fed, i.e., work is performed in synchrony with the machine cycles. This type occurs when operators must remove a part from a belt, process it, and return it to the belt before the next part passes out of reach.

From the above discussion, it should be obvious that numerous varieties of pacing exist, and that different paced systems may require different amounts of cognitive and motor activity from the worker. Unfortunately, many of the studies concerned with the effects of pacing fail to adequately document the specific characteristics of the system being examined.

The material reviewed in this paper seeks to clarify relationships between different machine-paced job demands, emergent stress in workers engaged in such tasks, and the potentiality for stress-related health disorders. By way of organization, relevant studies are grouped under two main subject headings, namely, field or worksite studies and laboratory research. For each subject area the previous work reported in the literature is summarized as a prelude for describing current or planned efforts by NIOSH to obtain definitive information on the problem.

In addition to the references cited in the text, a selective bibliography is provided at the end of the paper for the interested reader. Portions of this paper were based upon a literature review of job stress in machine-paced work conducted by Canyon Research Group (1977) under contract with NIOSH.

## FIELD STUDIES OF MACHINE PACING

Early field studies reported a variety of negative psychological reactions in workers involved in machine-paced jobs. These reactions included expressions of high job dissatisfaction (Wyatt and Marriott 1951), tension (Kretch and Crutchfield 1948), feelings of anonymity (Walker and Guest 1952), and under-utilization of abilities (Kornhauser 1965). Other studies have reported more frequent health complaints among workers in machine-paced tasks such as muscle cramps and spasms, nervous disorders (Komoike and Horiguchi 1971), and a range of psychosomatic problems including peptic ulcers, heart attacks, and strokes (Frankenhauser and Gardell 1976).

In a recent comprehensive study, Frankenhauser and Gardell (1976) studied machine and self-paced workers in Swedish sawmill operations using questionnaires, health examinations, and clinical laboratory tests. The authors found more feelings of monotony, general mental strain, and exhaustion at the end of the work day, as well as frequent sick leave requests and greater morbidity, among workers in machine-paced jobs than those in self-paced jobs. Medical examinations revealed a higher incidence of psychosomatic, cardiovascular, and stress disorders in workers involved in the machine-paced tasks as compared with those in non-paced jobs. Results of biomedical tests indicated elevated adrenaline secretion in those workers involved in paced job operations and a similar, though non-significant, trend for noradrenaline release.

Frankenhauser and Gardell (1976) related the biomedical findings to both self-reported feelings of "well-being" and measures of job repetitiousness. Specifically, low adrenaline release was associated with more positive statements of well-being and less job repetitiousness. Feelings of exhaustion at the end of the shift and the inability of machine-paced workers to relax soon after work were related to increased adrenaline secretion. The authors concluded that lack of control over pace work was an important contributing factor, producing increased "wear and tear" among workers engaged in machine-paced jobs.

In research conducted for NIOSH by the University of Michigan, workers in 23 occupations were surveyed via questionnaire for levels of job stress and strain and health status (Caplan et al. 1975). The 23 occupations included both blue and white collar jobs. Machine-paced assembly line workers (and their relief men) reported the highest levels of job stress and strain relative to all occupations studied. Significant sources of stress and strain evident in the questionnaire responses of these workers relative to other occupational groups were:

1. Underutilization of abilities--feelings that one's talents and skills were not being used to their fullest capacity on the job.

2. Decreased participation in decision making--having little or no input to the decision making process which affects how their job is performed.

3. Frequent feelings of boredom and dissatisfaction with the amount of work to be done.

4. Frequent feelings of anxiety and general irritability.

5. Frequent health complaints.

While these field studies suggest possible adverse psychological and health effects in workers engaged in machine-paced jobs, conclusions of this nature will require more definitive data. Indeed, the above mentioned studies did not acknowledge other factors in the work environment that may also have contributed to the indicated problems. Also, some of the results are based solely upon self-reported indications of job stress and health status, which could be open to bias.

Current NIOSH Field Studies

NIOSH is engaged in two projects aimed at verifying, as well as obtaining a more complete picture of, stress/strain effects and health difficulties connected with machine-paced work. One project deals with operators of multiple position letter sorting machines (MPLSM's) in the U.S. Postal Service; the second project deals with the U.S. Department of Agriculture (USDA) poultry inspectors.

MPLSM Operator Studies

In the MPLSM job the operator typically is seated at a console with a 10-digit keyboard and a display window. Letters are conveyed to the workstation and appear in the display window for approximately one second. The operator must scan the envelope address and then type three or four digits of the zip code which assigns the letter to the appropriate bin for local delivery. (Often the task can be more complex. What is presented here represents a simplified description of the task.) The operation is machine-paced at a rate which varies with local post offices, but is generally set at about 55-60 letters per minute. Operators typically work on this task for 45 minutes in a given hour and spend the remaining 15 minutes performing other duties.

Three different approaches are being used by NIOSH in examining job stress problems in MPLSM operators. These are: (1) a human factors evaluation, (2) a cross-sectional questionnaire survey, and (3) a longitudinal study.

Human factors evaluation--Using human factors experts, an evaluation will be made of the man-machine-environment interrelationships seen in MPLSM job operations. Operational and design features found incompatible or particularly stressful on human performance skills will be targeted in this effort. Plans call for the human factors study to include site visits to 15 selected MPLSM facilities. A checklist of factors will be developed for examination during these observations which will include job demands, keyboard design, informational displays, motion pattern analysis, man-machine interface compatibility, and psychosocial considerations. Detailed analysis of job demands will include physical demands on the operator (musculature requirements, work-rest cycles, work posture), cognitive demands (attention requirements and information processing load), and work environment factors (noise levels, temperature variations, lighting requirements, and workspace adequacy).

As already mentioned, the human factors evaluation will identify problems in the MPLSM operation due to inadequate interface between the worker, the machine, and the work environment. Such problems will become further elaborated in the two other phases of this project which concentrate on worker reactions to the demands of MPLSM work.

Cross-sectional questionnaire--The second part of the MPLSM project is a nationwide questionnaire assessment of job stress/strain and work conditions in 6,000 MPLSM operators and 6,000 control workers in 50 postal service facilities nationwide. The study sample will be stratified by major regions of the country and by facility size. The questionnaire is made up of different sections which assess job stress as produced by amount of workload, work pace, control over work pace, supervisor relations, and physical characteristics of the work environment. Questions are also included dealing with psychological and medical health status, Type A personality tendency, and measures of life stress. Responses of MPLSM operators and control workers will be compared to gauge the added stress and related effects expected from the machine-paced jobs.

The results of the questionnaire survey will define potential sources of job stress in these employees and highlight important stress points in their work situation. The large number of employees to be surveyed and the use of a stratified sample of facilities make the results representative of all MPLSM operators across the country.

Longitudinal study--The third part of this NIOSH project consists of a prospective, longitudinal study of MPLSM operators. It is being undertaken at a midwestern postal facility by the School for Workers, University of Wisconsin, in cooperation with the American Postal Workers Union and NIOSH. A group of about 50 postal employees who have little or no experience on the MPLSM, but who have been accepted for MPLSM training, are to be followed in this study for a period of four years. Prior to beginning full-time work on the MPLSM, each of these employees will complete a questionnaire on job stress/strain and give blood and urine samples for biochemical analysis and stress level determination. Levels of blood cholesterol, triglycerides, uric acid, protein, and other chemicals as well as urine catecholamines, will be assayed. The data will be used as a comparison base for measures taken at regular intervals over the four-year period after the employees become MPLSM

operators. The cycles of questionnaire and biochemical results over the four-year period will make it possible to determine both acute and long-term stress reactions generated by the MPLSM job.

The three field studies of MPLSM operators will together provide a broader perspective on the health consequences of this work operation. The results of these investigations complement one another and will alternately verify and strengthen obtained findings. By researching this machine-paced task with three methodologies, definitive conclusions will be possible.

USDA Poultry Inspectors Study

The second project underway at NIOSH concerning machine-pacing consists of a questionnaire survey of job stress/strain in the U.S. Department of Agriculture (USDA) poultry inspectors. At the request of the USDA, NIOSH has designed an evaluation of working conditions for poultry inspectors in such operations. The poultry inspection process is a machine-paced operation which requires both visual and manual examination of each bird to assure that it is free from disease. The birds are hung by the legs from shackles on an overhead conveyor system. Inspectors must recognize as many as 15 disease states, discolorations, or malformations and make one of the following decisions for each bird: (1) pass the bird as disease-free, (2) instruct the "trimmer" to trim off isolated diseased parts or save only certain acceptable portions of the bird, (3) place the bird on the "hang back" rack if unsure of a decision and allow the inspector-in-charge to examine the bird in more detail later, or (4) condemn the bird as totally unacceptable.

The study will consist of a questionnaire survey of poultry inspectors stratified by five major geographic regions. Like the one used for Postal Service employees, the questionnaire is designed to assess levels of job stress and strain, health disorders, and a wide range of work environment factors unique to poultry inspection operations. There are approximately 2,000 poultry inspectors nationwide and 240 inspection facilities. Questionnaires will be bulk-mailed to the inspector-in-charge at 121 plants for distribution to inspectors in selected plants. Approximately 1,500 inspectors will receive questionnaires, which represents about three-fourths of the population under study.

The results of this project will indicate whether this work group reports stress/strain and health problems similar to those found in other machine-paced work groups (Caplan et al. 1975; Frankenhauser and Gardell 1976). Moreover, the study complements the NIOSH-MPLSM research since, while both jobs are machine-paced, they differ significantly in terms of work pace, work cycle, and the cognitive versus motor demands of the task.

Overall, the significance of the NIOSH field studies reviewed above lies in their contribution to a data base on the stress and health effects of machine pacing. Such studies will also suggest specific job stressors worthy of more intensive examination in laboratory situations.

## LABORATORY STUDIES OF MACHINE PACING

In the context of studying stress in machine-paced tasks, the laboratory setting permits accurate manipulation of variables of interest (e.g., work pace, decision latitude, social interaction) and objective quantification of concomitant psychophysiological reactions to such manipulations. Psychophysiological reactions such as elevations in heart rate, blood pressure, and muscle tension have been shown to be sensitive to fluctuations in perceived psychological stress (Geldrich 1953; Obrist 1968) and are precursors of stress-related disorders.

There are four published studies on aspects of a force-paced task and assessed physiological reactions. Ettema and Zielhuis (1971) reported elevations in heart rate, blood pressure, and breathing rate with a decrease in sinus arrhythmia (i.e., heart rate variability) as performance requirements on a simple binary task increased from low to high levels. The authors did not, however, evaluate comparative reactions in paced versus unpaced subject groups. Amaria (1974) found higher heart rates under three conditions of force-paced work as compared with heart rate when subjects worked at their own chosen pace. Johansson and Lindstrom (1975) reported that subject-controlled performance rate on a complex reaction test was judged more favorably and was associated with lower heart rates than a work pace controlled by the experimenter. In contrast, Manenica (1977), using a simulated assembly task, found greater sinus arrhythmia among subjects who paced themselves and concluded that unpaced work was more demanding and imposed a higher load upon the subject than force-paced work.

These laboratory studies have not produced consistent results regarding psychophysiological reactions to machine-paced work. On the other hand, only one study (Manenica 1977) attempted to simulate an actual work task; the others used performance situations which bore no resemblance to a work situation. This represents an important methodological issue since it affects the subject's attitude toward the task and motivation to perform. Other limitations in the design of these studies include the use of very short test sessions, the absence of motivational or incentive factors which are typical in actual work settings, and the lack of attempt to consider social support or other workplace factors that can buffer apparent stress.

In retrospect, the laboratory research on this problem to date has not considered the range of factors that deserve highlighting for their real or alleged contribution to stress/strain and stress reduction in machine-paced work regimens.

### NIOSH Laboratory Research

Recognizing the need for more meaningful laboratory research on machine pacing and its effects on physiological function, NIOSH has designed laboratory research with the following features:

1. Computer simulation of a punch press operation on video display screens.

2. Subjects "work" at the task for 8 hours per day (with

rest breaks in the morning and afternoon and a lunch break) for a full 5-day work week as is typical in an industrial situation.

3. Manipulation of aspects of machine pacing, including speed of work pace, degree of control over pace, task complexity, work incentives, and social interactions.

4. Performance measures of error rates and total work output.

5. Continuous, noninvasive monitoring of heart rate, blood pressure, muscle tension, and respiration rate.

6. Periodic assessment of subject's attitude toward manipulations.

7. Periodic assessment of fluctuations in psychological mood states.

Psychophysiological reactions to aspects of machine-paced work will be assessed to determine the relative impact of each on worker stress. The results will represent a significant contribution to the available literature in terms of the detail of the task analysis and the precision, sensitivity, and comprehensive nature of the measurement tools employed.

SUMMARY

As you can see, NIOSH has placed a great deal of time and energy into the study of the stress/strain effects of machine-paced work operations. This was justified in view of the paucity of research findings in literature, the scattered implications of serious health consequences of forced paced work routines, and the relevance of such research to large groups of workers engaged in such operations.

The output of the NIOSH studies, both in the field and in the laboratory, will provide a data base in this area of occupational health research for ascertaining in a more definitive way the prevalence of stress/strain effects of machine-paced work operations and the impact of such effects on worker health.

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# PSYCHOLOGICAL JOB STRESS AND CORONARY HEART DISEASE--

## A CURRENT NIOSH PROJECT

Joseph F. Chadwick, Ph.D.

Stanford Research Institute (SRI) is investigating the relationship between psychological job stress and one aspect of physical health -- coronary heart disease (CHD). CHD is a major disease in the general population. It is also a major factor in lost productivity, workers' compensation costs, and the cumulative injury and disability problem in industry.

As Dr. Murphy pointed out, we are in a very early stage in stress research. We must begin to take a closer look at specific issues. In doing so, we find that there are many different kinds of stress problems with many associated complications. Thus, this discussion may be somewhat technical, but I hope that it will illuminate stress problems in a new and useful way. At this time, I am only going to discuss the results that we have from our base line examination; that is, from one cross-sectional collection of data on our study population.

There is one phrase I will be using, "conjectures and refutations." We need a lot of conjectures to carry science forward. Since most conjectures turn out to be wrong, we also need many refutations. Where we can, we seek replications, or conjectures that actually hold up. We must willingly be somewhat skeptical and must accept that many of our conjectures will fail when they come under the scrutiny of repeated testing. This theme will recur in my discussion.

Our study is a longitudinal one of stress and strain that includes a discussion of stressors and heart disease risk factors. We are not dealing with a very large population, but we have enough heart attacks and related deaths to study the phase before CHD; namely, the CHD risk factors. What is the effect of psychological stress on the social climate of the work environment? Does it result in physiological strain, which constitutes a cardiovascular or coronary heart disease risk factor? At the same time, individuals are subject to other life stresses. For example, they have home environments that affect them. I am calling this type of stress a compounding factor, rather than a main factor. The reason will become clear as we go on.

Actual heart disease status in this case is also a compounding factor because we do not have enough data on it. We don't have a longitudinal set of CHD events. So if someone, for instance, has had a heart attack, that is a compounding factor in the sense that it will affect his job psychology, or his attitudes toward the job. In this study we excluded individuals who had what is known as definite clinical heart disease.

When you become involved with CHD and general health areas of study, you run into a number of difficult conceptual barriers. One barrier is what I call the "dense underbrush of findings." There are so many similar findings or statements of possible effects, which are still mostly conjectures, that they

distort the study's focus and make it very hard to see what are really the key issues. There is also what is known as "ecological masking of diverse trends." For instance, if you have one person who views overload as distressful and another person in the same population who views underload as distressful, it substantially complicates your ability to find out things. Another barrier the phenomenon that is known as "assortive mating." It means that we have many situations where an individual will gravitate to an environment that fits him and hence tends to cancel out the effect of the environment. In this study we see a substantial amount of this.

Since accommodation coping and assortive mating often occur, it becomes very hard to say what is a stressor for a given individual; and, for that reason, you are considerably dependent in most instances on self-reports. In many cases it has been extremely difficult, if not impossible, to obtain objective measures of stress and work load that will predict without the aid of self-reports. Thus, you are very dependent on self-reports, and you will find that many people will often self-report stress along with the psychological distress which quite often accompanies that stress. But it is still very difficult to definitively trace the cause and effect of stress. I think in most cases the process is circular. Stress will cause psychological distress or mental health problems. Mental health problems in turn will often exaggerate or accentuate the pressure of a given situation, and cause more stress on a given individual. It is very hard to get away from this circularity.

I want to quickly review some of the background. CHD is the particular example we are concerned with. There is way too much literature to review here so I will very quickly discuss some of the literature reviews themselves that have been written in recent years. All of these are concerned with the relationship of psychological factors to medical health.

Dr. Weiner has recently reviewed the last 20 years of progress in psychosomatic medicine in his book, Psychobiology and Human Disease. He chose what he thought were the six most important diseases in terms of the classic definition of this field. These were the diseases that people in the field have put the greatest emphasis on and felt were the strongest examples of psychosomatic diseases. This book is over 600 pages and contains more than 3,000 references. I have not yet found a single statement in the book that would say psychological factor "x" is definitely related to health factor "y" to a quantative degree "z." I think this is indicative of some of the difficulties in this field. My impression is that the statements made by Dr. Weiner in 1977 are substantially less positive than the statements made in this same field 20 years ago. I do believe, however, that there are many results of real significance in this area, but they are very hard to find.

Dr. David Jenkins has written a number of reviews specifically on the relationship between psychological factors and CHD. To my knowledge, his most recent review is "Evidence for Psychologic Risk Factors in CHD" in the New England Journal of Medicine (1976). From my determination, he makes unequivocal assertions of the existence of an effect only for coronary-prone behavior, the Type A-Type B behavior phenomenon. The effects can actually be quantified, showing approximately a 2:1 occurrence rate of heart attacks among Type A versus Type B individuals.

What we see in the literature is a common and typical failure to replicate results. However, it would not be advisable to assume that every conceivable conjecture would be replicated. Therein would lie the greatest danger. Thus, we see something that is common throughout science; namely, that there are hundreds of papers containing many conjectures with frequent refutations; that is, failures in replicating an effect in a laboratory using its own measures. More frequently, there is a failure, or lack of attempt, to replicate across laboratories. In some cases replication is attempted using different measures which are not standardized. It is of the essence to recognize this situation and attempt to replicate important results as they are recorded. Then if we can't replicate them, we refute them. I believe that there should be a sunset law on conjectures so that if they are around for three to five years and have not been replicated, they should be refuted.

The relationship between stress and distress has been replicated repeatedly. There is no question of the existence of the phenomenon or of the individuals' self-reporting job stress by a number of definitions. These findings are substantiated by a review of self-reports of psychological distress on a number of parameters, which here are called strain indicators (see Table 1). There is strong correlation between stress and distress. This strong correlation is a recurring phenomenon.

Table 1. Mean z-scores on strain indicators in relation to job stress.

| Strain indicator | Overall Job Stress Low | Medium | High | F-ratio |
|---|---|---|---|---|
| Depressed mood | -0.29 | -0.04 | 0.43 | 64.62* |
| Self-esteem | 0.32 | -0.01 | -0.41 | 63.58* |
| Life satisfaction | 0.29 | 0.01 | -0.40 | 57.58* |
| Job satisfaction | 0.49 | 0.09 | -0.78 | 246.51* |
| Motivation to work | 0.28 | 0.06 | -0.46 | 69.24* |
| Intention to leave job | -0.22 | -0.07 | 0.39 | 47.01* |

*p less than 0.001
Source: Margolis, Kroes, and Quinn, 1974.

To elaborate, we find that life stress as measured by the Holmes and Rahe Life Event Scales correlates with psychological distress as measured by the Symptom Check List. Both of these devices are standard, well-known measures. In our data and in data drawn from several other studies, psychological distress and life stress both correlate with angina or chest pain. Presumably heart-related problems and neuroticism, which contains elements of mental health and distress, correlated with angina. If we base conclusions on this presumption, we can say that this apparently solves the problem. We have stress, causing psychological distress, causing heart disease, which is followed by angina. Unfortunately, this paradigm does not survive closer examination.

Here is a study, similar to many others, that gives us essentially the same results. People report chest pain, and if it is a substantial pain, their physicians conclude that it is serious and needs confirmation. They then go through a catheter lab procedure and contrast angiography, which allow their

coronary arteries to be examined for stenosis or occlusion. The results show that some of these people have relatively normal arteries; not necessarily perfect, but with what would be called insignificant disease. Most have significant disease. It turns out that if you come to that examination with a higher degree of life stress, as defined by the Holmes and Rahe scale, and with a higher degree of psychological distress, as defined by the previously discussed symptom distress list, your arteries are more likely to be normal than those of someone who did not have similar degrees of stress and distress. It appears that stress and distress protect your arteries, but we certainly do not believe that. Instead, we must believe that there is a substantial amount of circularity present where distress may cause persons to report more chest pain than they otherwise would. Other factors that cause them to experience stress or to report distress may also cause them to report more chest pain than they would otherwise. This complication makes highly fallible the resulting measurements in the study of job stress and CHD.

Another facet of the problem concerns the previously discussed fact that the only concept that is realistic concerning behavior and psychogenic phenomena in relation to CHD is the concept of coronary-prone behavior. Consider the cases where individuals have been interviewed, rated Type A (high stress), versus Type B (low stress), and then have had coronary angiograms performed. In three such separate and independent studies, Type A's had more than twice the rate of significant coronary artery diseases than Type B's, with Type A's having substantially higher numbers. In 3,000 men followed for 8 1/2 years in the Western Collaborative Group study of Dr. Friedman and Dr. Rosenman, Type A's had twice the CHD rates as Type B's. But we also find that although Type A's may be under more stress, they do not report either more or less life stress, job stress, or psychological distress than B's. Thus, the job stress-psychological distress paradigm is important: It represents a phenomenon in itself, not strongly connected into the coronary heart disease and stress loop, and is the focus of current thinking in the job stress field. If we were to write a book on the subject, we could call it "The A's Die Quietly," because they do die. It may be that they have more stress, but we cannot rely on them to report it.

Our discussion next involves another paradoxical study that is actually quite parallel to our study in some ways. It is not concentrated on CHD or even on medical health, but it is a stress-strain study of an occupation over a period of time. It is a three-year study of a very interesting group -- air traffic controllers. This is the best study of job stress and strain that has ever been performed. The study has been recently completed and is just now being reported by Robert Rose and his associates.

In this group of air traffic controllers, the hypertension rates are remarkably high, at least double the expected rate. Interestingly, the Type B's and particularly those Type B's that also had less life events, had the highest incidence of hypertension. The other most notable finding was the very high degree of impulse control problems. Thirty percent of these individuals were hypertensive, and 30 percent showed appreciable impulse control problems over the three-year study period. It was surprising that the B's, who reported less life stress events, were the ones who had the highest blood pressure. The ones who had the impulse control problems were the A's who also reported more events. The last finding is not surprising as our data

show consistently that Type A's are more impulsive than B's, plus I believe that an air traffic controller is one whose job requires impulse control.

To illustrate the level, nature, and complexity of the conjectures you may have to make to explain these kinds of facts, here's a hypothesis. You could say that since B's are not as impulsive as A's, the B's are not impulsive enough for the job. Therefore, performing at work puts more stress on them, which results in higher blood pressure. The A's are more impulsive; therefore, they do the job better. Their blood pressure doesn't go up, but they have unrelated impulse control problems because probably the group as a whole is abnormally impulsive. That would explain two of these three findings, and is certainly the level of hypothesis needed to explain this kind of data.

Why did the Type A's have more minor illness? That question could hypothetically relate to the AB measure used in this case which is the Jenkins Activity Scale(JAS). The JAS is a self-report questionnaire that is not the same thing as the interview, which is the official procedure for defining Type A's and Type B's. The JAS has some components that tend to pick up life stress, work stress, and psychological distress, and thus tends to also collect minor illness.

With this background, I will describe our research program. We studied a white collar, professional group of approximately 400 first and second level managers and supervisors. They were all salaried, male employees at a large aerospace corporation. In the study population we also identified four different groups of managers to see what the differences might be among these groups when tested on several variables. The four groups were finance and accounting, product assurance, new business, and a cross-section comparison group. The study proceeded by giving all 400 study subjects a large number of tests at the start (base line), and then repeated the examination on 220 of those individuals at five intervals. As the examinations were repeated, there was a continuing weekly reporting of work load and job stress by the 220 individuals. Below are listed the measurements used in the study.

PSYCHOSOCIAL AND GENERAL HISTORY VARIABLES

Type A/B Interview
Jenkins Activity Scale
Type A/B Scale Thurstone
Type A/B Scale Vickers
Type A/B Scale Framingham
Eysenck Personality Inventory
Gough Adjective Checklist
Addiction Proneness Scale
(from MacAndrew et al.)
plus Weekly Workload Reports
Work Environment Scale
Family Environment Scale
Life Events Holmes and Rahe Type
Symptom Distress Checklist
Job stress, satisfaction,
and support measures
Smoking, alcohol, caffeine
consumption rates
Physical exercise rate

## PHYSIOLOGICAL VARIABLES

Cardiovascular variables:
- Pulse rate
- Blood pressure
- Resting ECG (read by computer for prognostic indications)
- Cold pressor test response

CHD and other health findings by self-report, including:
- Family history of heart disease
- Own history of heart disease
- Symptoms of Dyspnea
- Symptoms of angina
- Symptoms of claudication
- High blood pressure

Physiological strain variales:
- Uric acid
- Blood glucose
- Dopamine-beta-hydroxylase
- Total cholesterol
- HDL cholesterol
- LDL cholesterol
- Triglycerides

You will notice that in addition to a total cholesterol measure, we also used measures of HDL and LDL cholesterols because we had discovered that one cholesterol, the high density protein fraction, is protective, whereas most of the other cholesterols increase the risk of heart attacks. This is a very important distinction.

We studied an aerospace company because it was large and was involved in high pressure work. We chose groups that seemed to be under greater pressure than the company as a whole. Thus, a conjecture would be that these groups should be at higher-than-normal CHD risk rates. We then compared the z-scores of the entire study population against the best national norms available to us to determine by standard deviations how our population differs from what is typical in the United States. We found that our 400 subjects were slightly lower on most CHD risk factors, including total CHD risk. Thus, we were not able to show that the study group was at abnormal risk for CHD even though we went to great lengths was to find high-risk people.

Also, there were no significant differences among our groups in terms of CHD variables. On the other hand, the groups were substantially different on personality and work environment variables. There was clear evidence of assortive mating on those variables. For instance, we could separate the finance and the new business groups on the basis of the variables with only about a 20 percent error. But on the CHD variables, we couldn't separate them at all. Thus, we had succeeded in finding groups that were substantially different in their personalities and their work environment, but not in their CHD variables. The new business group which we thought was under the highest stress, was slightly better off in terms of CHD risk factors than the other groups.

Another dimension of the study, the Type A-Type B personality dimension, is very important to the overall study. We had both A's and B's, which we could distinctly separate into groups, but they were not appreciably different on CHD risk factors, psychological distress, work pressure, or life events. They were sharply different on conventional personality variables, AB variables, and responses on the Gough Adjective Checklist. Our A's asserted less self-control than B's, and A's also asserted that they are in an environment with less control than B's. Both of these findings are highly significant.

There are a number of measures of the AB dimension but the interview (the basic measure) is the most important dimension we know of in terms of the CHD problem. This was developed by Drs. Rosenman and Friedman and involves an interviewer talking to someone for 15 minutes, then asking some standard questions, and finally deciding if the person is type A or B. To try to simplify this procedure, many people have attempted to assemble self-report questionnaires, the most well-known being the Jenkin's Activity Scale (JAS). None of these self-report questionnaires correlate to a major degree with the interview. The JAS is only 15-20 percent as effective as the interview. Although the JAS and other AB determination scales do not correlate highly with the interview, they do correlate well with other things in the job stress field, such as work stress and alcoholism and must, therefore, be considered somewhat useful. It is not practical, however, at the present time to use any self-report measure as a substitute for the AB interview.

Two other scales were found to be extremely interesting and probably useful in this field. One scale, addiction proneness, predicts a tendency to substance abuse, such as alcohol, cigarettes, and heroin. Another scale is impulsiveness, which is a standard scale. Impulsiveness is a component in measuring AB and addiction proneness and seems to be quite important in itself. It was a very important factor among the air traffic controllers, and it may be important in similar jobs involving a hectic, stressful situation where fast decisions are needed.

We had a number of work environment variables that were being used for the first time in this context. There were 10 scales which, when boiled down by factor analysis, reduced to three scales. One was a set which together made up a global work factor which indicated whether people felt good about their work or not. The other two separate factors were job pressure and work control. These are important dimensions of the work environment which are going to be useful in the future.

We found that several of the AB self-report scales correlated with other things. We can explain some of the differences between the scales and the interview by their relationships to stress, anxiety, and alcoholism. Dr. Glass, who has done research in the field of AB and has mainly the use of JAS, makes the assertion that the alcoholic is really a workaholic who doesn't become a workaholic; or that alcoholism and workaholism are two branches of the same phenomenon. This is only true if the JAS is used as the measure. When the interview is used as the measure, this is not true.

When reviewing our results, we noted that AB factors do relate to heart attacks, but do not correlate too well with CHD risk factors, and subsequently tried to turn this observation around and look at the risk factors themselves.

The more conventional risk factors show all the usual correlations among themselves and with cardiovascular status, but they show almost nothing else. With quite a number of unconventional CHD risk factors, we do see some interesting phenomena. It is questionable whether the CHD relationships are at a sufficient level to explain the amount of heart disease associated with Type A behavior, at least in looking only at base line data. When we start to look at repeat data such as HDL cholesterol though, we can see different aspects of the study. HDL cholesterol, which is actually a cholesterol that is good for you, is one of the strongest favorable factors. It and triglicerides tend to work in opposite directions in term of CHD risk factors. They will be important variables in future studies because HDL correlates with almost everything good and triglicerides correlate with everything bad. We even see correlations of HDL with angina and dyspnea and these relationships are almost certainly real. It is hard to see where the psychological circularity could enter the picture.

We have new correlations of factors which are protective to CHD status also. A higher level of HDL correlates with better CHD status. It also happens to correlate with levels of alcohol consumption, which is consistent with some fairly recent findings which show that alcohol consumption is protective of your coronary arteries. We believe the protective mechanism to be the raising of the HDL level.

When viewing job stress and CHD as a process, we see that in the CHD problem, the stress-distress paradigm is a somewhat separate phenomena, which is mainly compounding. We see that the relationship of the Type A personality to coronary heart disease is real, and very likely neurogenic. At the present time we do not have a definite understanding of the mechanism as yet, so we can say at this point, "A's die quietly." It is clear that to find the mechanism we are going to have to look at second order things: the person-environment fit and nonlinear interactions of several things, such as impulsiveness, and what requires this impulsiveness. We are going to have to look at the changes turned up in repeat examinations. Cross-sectional studies will not suffice because the tremendous amount of coping that has taken place before a study is started has wiped out a great deal of the differences that you are looking for.

That is where we stand today. I hope that these results have illuminated one side of the problem. Perhaps next year we can give you more information on this subject.

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# DIMENSIONS OF CUMULATIVE INJURY

Alan Tebb

The purpose of this discussion is to report to you the results of a two-year research effort to define and quantify the impact of the cumulative injury (CI) phenomenon upon the California workers' compensation system. Data for the exhibits are drawn from a review of cumulative injury claims of California employees. The results may or may not have application to other states. We think that they do and that the differences are only of degree, not substance.

As a corollary to this caveat, I suspect some of you with interests in other states may be content to look upon cumulative injury as a peculiarly California phenomenon. Please don't take any comfort in that supposition because cumulative injury is not peculiar to California. The seeds are present in the statutory and decisional laws of many states--Florida, Illinois, Kentucky, Michigan, Virginia, Connecticut, and New York, to name just a few. California differs only because it assigns a particular label to describe the phenomenon, and because of the frequency and severity of the manifestation of that phenomenon.

Cumulative injury is a judge-make doctrine that recognizes that a series of micro-traumas over time can produce a disability and that such a condition is compensable under California law. The classic example is the boilermaker who develops a hearing impairment after a working lifetime in noisy job environments. Unlike the more common traumatic injury, our example has no single identifiable incident; instead, prolonged or repeated exposure or both led to a partial loss of hearing. More typical today are back injuries attributable to lifting and bending over a period of years. Now an ever-increasing number of California employees are asserting cumulative injury claims for heart ailments, vascular conditions, mental stress and strain, and even neuroses.

Lawyers claim there's nothing new about cumulative injury, in California or elsewhere. Actually, the concept has been recognized for at least 50 years in this state. What is new is that the concept has broadened, and the frequency of such claims threatens to rival fast food franchises in terms of growth.

In 1974, less than 1 percent of disabling work injuries in California were cumulative injuries. In 1977 however, the incidence had risen to 2 1/2 percent, and a year later 3 percent of all disabling injuries were cumulative. Admittedly, those figures are still a minor part of the total of disabling injuries, although a threefold increase in five years suggests exponential growth. Moreover, the numbers take on an added dimension when costs are considered.

In 1976 cumulative injury claims in California cost insured employers $137 million, almost every eighth compensation claims dollar. Last year's (1977) cost is estimated at $166 million and, if the results of the Institute's latest study are an indication, incurred cumulative injury losses will exceed $200 million in 1978. By the end of the decade cumulative injury losses will pass the $300 million mark--without any change in benefit levels.

These figures, their impact on the business community, and the rapid escalation in the frequency of cumulative injury claims led to a massive research effort by the workers' compensation insurance industry. It began in September of 1976 when the California Workers' Compensation Institute (CWCI) was commissioned to define, on an industrywide basis, the extent and scope of cumulative injury in California, a subject about which much was surmised but little was known. As a result of this research, today we have some of the answers.

The study itself involved a detailed review of all cumulative injury claims resolved or reported during January and February of 1977. And then, because the 1977 results only provided a picture at a particular point in time, the same measurements were taken during the first two months of 1978. Although reporting was simplified in 1978, the two studies are virtually identical in size, scope, and methodology. The dimensions of these undertakings can be judged by some numbers:

--Forty insurers writing about 90 percent of statewide premiums articipated in the studies.

--Over 200 people were involved in the study design and the development of format, programming and verification procedures.

--Three times that many people were involved in the compilation of data at 185 branch and division offices of cooperating insurers.

--The data base for each study ultimately included over 1 million pieces of information.

--The compilation, analysis, and interpretation of these data bases required, conservatively, 10,000 manhours for each study.

The data in Table 1 are outside the scope of the CWCI studies. They show the growth of cumulative injury claims during the most recent three-year period, according to statistics compiled by the Workers' Compensation Appeals Board, the state adjudicatory agency. You'll note a 20-25 percent annual growth rate.

Table 1. Frequency of cumulative injury.

| Fiscal year | Number of cumulative injury applications | Increase over prior year |
|---|---|---|
| 1975 | 8,974 | ---- |
| 1976 | 10,971 | 21.1 |
| 1977 | 13,393 | 23.2 |

The Appeals Board figures are compiled on a different basis and for a different purpose. We think the true growth is understated. Based on input to the 1977 Institute study, the number of cumulative injury claims filed during calendar year 1977 is estimated at 16,200. The 1978 calendar year total will exceed 19,900, up 30 percent from last year. When you look at the increase in the number of employees filing cumulative injury claims though--

recognizing that some employees file more than one claim--the increase is in the neighborhood of 40 percent annually. That is a substantial increase indeed.

Table 2. Age at injury as a percent of total cases.

| Age | Percent All Disabling injuries | Percent Cumulative Injuries 1977 | 1978 |
|---|---|---|---|
| 36 years or less | 57.4 | 18.0 | 18.2 |
| 37-51 years | 27.1 | 34.2 | 32.5 |
| 52-60 years | 11.7 | 30.6 | 29.8 |
| 61-65 years | 3.0 | 13.5 | 14.6 |
| Over 65 years | 0.8 | 3.7 | 4.8 |
| Median age in years | 33.4 | 51.2 | 50.7 |

We found workers affected by cumulative injuries are, on average, significantly older than other injured employees, with a median age of 51 years compared to 33 years (see Table 2). Nearly half are 52 years or older although they account for only about 15 percent of the cumulatively injured workforce.

Table 3. Age at injury as a percent of dollar loss.

| Age | Percent of Dollar Loss 1977 | 1978 |
|---|---|---|
| 36 years or less | 7.7 | 12.5 |
| 37-51 years | 37.0 | 33.6 |
| 52-60 years | 37.0 | 34.2 |
| 61-65 years | 13.6 | 15.1 |
| Over 65 years | 4.7 | 4.6 |

Table 3 shows the loss patterns for both 1977 and 1978 which underscore the older worker aspect of cumulative injury--in part reflecting the accumulation of infirmities over a lifetime, both working and non-working, and the prospect of retirement.

Last year we found 1 in 11 workers already was retired before claiming compensation for cumulative injury. In order to test the assumption that some claims may originate with preparation for retirement, we made a different measurement this year.

Table 4. Employment status at disposition.

| Status | Percent of cases | Percent of total loss |
|---|---|---|
| Employed, employable | 50.3 | 30.8 |
| Disabled | 27.2 | 37.8 |
| Retired | 18.5 | 24.4 |
| Deceased | 4.0 | 7.0 |

Rather than look at the worker's employment status at the time of filing, we felt a better indicator would be employment status at the time the claim was resolved. Looking at Table 4, you'll note that about 25 percent of the cumulative injury claim payments are made to retired workers. We believe this supports the thesis that a significant number of cumulative injury claims are a pension supplement and do not compensate for the employee's reduced ability to compete in the labor market--a labor market of which he is no longer a part.

The retirement relationship also is borne out in the allocation of cumulative injury benefit dollars (Table 5).

Table 5. Distribution of the benefit dollar.

| | Percentage of Total Incurred | | |
|---|---|---|---|
| | Medical | Temporary disability | Permanent disability |
| All injuries | 39.0 | 22.1 | 38.9 |
| Cumulative-1977 | 18.8 | 7.9 | 73.3 |
| Cumulative-1978 | 19.0 | 5.9 | 75.1 |

The cost of medical treatment is less than half of that necessary in other work injuries. In many instances, wage-loss benefits are only a third of what they are in other compensation cases because the disability isn't severe enough to prevent working. Instead, most of the dollars are spent for permanent disability--again, intended to compensate for the employee's reduced ability to compete in the open labor market--even though the employee may be retired or about to retire.

Table 6. Nature of principal injury.

| Injury | Percent of all Disabling injuries | Percent of All Cumulative Injuries 1977 | 1978 |
|---|---|---|---|
| Back | 24.9 | 37.7 | 34.3 |
| Heart/vascular | 7.4 | 21.1 | 22.7 |
| Hearing loss | 0.2 | 15.7 | 13.2 |
| Extremities | 54.1 | 11.5 | 14.4 |
| Neurosis | n.a | 7.2 | 5.9 |
| Pulmonary | 0.6 | 1.0 | 1.9 |
| All other | 12.6 | 5.8 | 7.6 |

Back injuries are the most common cumulative injury, followed by heart and vascular conditions with incidences far greater than those affecting the injured workforce generally (Table 6).

Table 7. Nature of principal injury.

| | Percent of Total Cases | |
|---|---|---|
| Injury | 1977 | 1978 |
| Back | 32.7 | 26.9 |
| Heart/vascular | 40.8 | 39.9 |
| Hearing loss | 6.6 | 10.2 |
| Extremities | 7.3 | 4.4 |
| Neurosis | 7.0 | 7.1 |
| Pulmonary | 1.0 | 4.3 |
| All other | 4.6 | 7.2 |

The ranking of back and heart injuries is reversed when compensation dollars are taken into account. These two most common conditions--both closely associated with the aging process--account for more than two-thirds of all cumulative injury claim payments (Table 7).

Table 8. Loss distribution by industry group.

| Industry | Percent of Total Cases 1977 | 1978 |
|---|---|---|
| Agriculture | 2.3 | 2.8 |
| Mining/petroleum | 1.4 | 1.7 |
| Food and tobacco | 3.4 | 4.0 |
| Textiles | 0.9 | 1.5 |
| Rubber/plastics | 5.1 | 3.1 |
| Wood products | 2.8 | 2.1 |
| Metalworking | 11.0 | 13.3 |
| Construction | 17.9 | 22.0 |
| Trucking | 3.1 | 3.7 |
| Utilities/service | 6.4 | 6.0 |
| Wholesale/retail | 9.6 | 10.4 |
| Clerical & professional | 7.0 | 9.9 |
| Municipal government | 18.2 | 16.3 |
| Miscellaneous | 0.9 | 1.6 |
| Unclassified | 10.0 | 1.6 |

More than two-thirds of cumulative injury claims occur in five broad industry groups: state and local government; construction; metalworking; wholesale and retail trade; and clerical and professional (Table 8).

Table 9. Loss distribution by industry group.

| Industry | Percent of Total Dollar Loss All disabling injuries | Cumulative Injuries 1977 | 1978 |
|---|---|---|---|
| Agriculture | 6.3 | 1.4 | 3.1 |
| Mining, petroleum | 1.6 | 0.9 | 0.8 |
| Food & tobacco | 4.1 | 1.8 | 2.5 |
| Textiles | 1.5 | 0.6 | 1.8 |
| Rubber/plastics | 4.8 | 2.2 | 1.0 |
| Wood products | 2.2 | 1.8 | 1.8 |
| Metalworking | 14.2 | 5.1 | 8.0 |
| Construction | 14.4 | 7.2 | 6.1 |
| Trucking | 5.0 | 1.1 | 3.1 |
| Utilities/service | 9.7 | 5.1 | 7.2 |
| Wholesale/retail | 13.5 | 7.2 | 6.5 |
| Clerical & professional | 8.9 | 8.0 | 16.6 |
| Municipal government | 11.4 | 54.3 | 39.7 |
| Miscellaneous | 2.7 | 0.2 | 0.3 |
| Unclassified | --- | 3.4 | 1.5 |

These same categories account for more than three-quarters of the incurred cumulative injury loss (Table 9). Admittedly, these distributions are heavily weighted by the statutory presumptions of compensability for heart trouble and certain other conditions of public safety employees. However, when municipal

losses are excluded and the tables restructured, the pattern of cumulative injury losses parallel the loss pattern for other injuries. The point is that the cumulative injury phenomenon is pervasive and common to all occupations. No industry is unaffected. Any state differences, again, are more of degree than substance.

Litigation is a fact in cumulative injuries. Virtually all such cases are litigated, and almost without exception, the filing of an Application for Adjudication (California's equivalent of a request for hearing, signalling a dispute) is the employer's or insurer's first notice of injury.

The average incurred loss per cumulative injury claim is about $8,600, nearly 5 times the value of other disabling claims. However, employees may file more than one CI claim--cumulative injury to the heart, cumulative injury to the back, a hearing loss, etc.-and when these claims are consolidated, the average recovery per claimant is slightly higher, at about $9,100.

Table 10. Average litigation expense.

| | Per Case | | |
|---|---|---|---|
| Litigation expense | 1977 | 1978 | Percent change |
| Attorney fees-employee | $ 780 | $ 843 | + 8.1 |
| -employer | 401 | 478 | + 19.2 |
| Medical-Legal-employee | 357 | 446 | + 24.9 |
| -employer | 272 | 274 | + 0.7 |
| Other -employee | 52 | 37 | 28.9 |
| -employer | 88 | 124 | + 40.0 |
| Totals | $1,950 | $2,202 | + 13.9 |

In California the employee's attorney's fee is paid out of the proceeds, so the claimant's take-home was $8,400 last year and $8,200 this year. Table 10 shows the direct costs involved in delivering $8,000-plus in benefits, including a litigation overhead of 23-27 percent. Collectively, these costs are more than physicians were paid to treat the effects of cumulative injuries.

Table 11. Time-lag between date application filed and date of appeals board disposition.

| | Percent of Total Cases | |
|---|---|---|
| Time-lag | 1977 | 1978 |
| 12 months or less | 40.3 | 36.3 |
| 13-24 months | 37.4 | 41.9 |
| 25-36 months | 13.8 | 14.2 |
| More than 3 years | 8.7 | 7.6 |

Yet another litigation cost, difficult to measure but nonetheless real, is the built-in delay. The reality is that it takes time to untangle liability and

apportion costs. Although a significant number of cases are resolved within a year, 22 percent of the cases are still pending two or more years after filing (Table 11).

Table 12. Time-lag between date application filed and date of appeals board disposition.

| | Percent of Dollar Loss | |
|---|---|---|
| Time-lag | 1977 | 1978 |
| 12 months or less | 31.7 | 32.3 |
| 13-24 months | 40.5 | 41.7 |
| 25-36 months | 17.1 | 14.6 |
| More than 3 years | 10.7 | 11.4 |

These tough cases with long delays represent more than a fourth of the incurred dollars (Table 12). This hardly seems the expeditious, inexpensive, and unencumbered justice guaranteed by the California constitution.

Table 13. Disposition of litigated cases.

| | Percent of all Dispositions | | | |
|---|---|---|---|---|
| Case | Compromise & release | Findings & awards | Dismissal | Take Nothing |
| All applications | 49.6 | 36.5 | 11.1 | 2.8 |
| Cumulative injuries | | | | |
| 1977 | 67.5 | 17.5 | 11.6 | 3.3 |
| 1978 | 70.8 | 16.2 | 11.2 | 1.8 |

Two-thirds or more of all cumulative injury cases are resolved by the Compromise & Release Agreement, which contains a rate one-third higher than in other litigated claims in California (Table 13). We think this is attributable to the nature of cumulative injury claims: defense is difficult, liability is splintered, and long delays push both parties to compromise.

Table 14. Geographic distribution of cumulative injury litigation.

| | Percent of Total Cases | |
|---|---|---|
| Area | 1977 | 1978 |
| Greater Los Angeles | 63.1 | 63.5 |
| San Diego, Imperial | 2.0 | 3.2 |
| Central Valley | 3.1 | 10.9 |
| North Central Valley | 10.0 | 2.2 |
| Bay Area, North Coast | 14.3 | 15.2 |
| San Jose, Salinas Valley | 7.4 | 5.0 |

These longer duration cases accounted for over 60 percent of the incurred cost (Table 17). What this means--or meant, prior to the enactment of the allocation legislation last year--is multiple representation of employers and insurers at multiple hearings, inordinate delays, and gross inefficiency. For example, the typical cumulative injury case involved 2.7 defendant employers and 3.3 defendant carriers.

Table 18. Time-lag between policy inception and date cumulative injury claim incurred.

| | Percent of Total Cases | |
|---|---|---|
| Period | 1977 | 1978 |
| Less than 1 year | 25.3 | 27.1 |
| 12-24 months | 14.8 | 14.3 |
| 25-36 months | 11.4 | 10.7 |
| More than 3 years | 48.5 | 47.9 |

The cost accounting problems of insurers are charted in Table 18. Only one in four cases are reported during the term of the employer's current policy. Plus, nearly half of the cases aren't established for three or more years after policy expiration, after payment of dividends, and after the experience ratings have been computed. Ultimately, of course, the new legislation will bring costs more into line with premiums.

Let me conclude by citing the conclusion reached in last year's report by the Institute. I apologize to those of you who have already read it, but the words clearly define what the insurance industry believes to be the issue. It reads as follows:

> The central problem presented by the cumulative injury phenomenon concerns the objectives of workers' compensation. If workers' compensation is a rehabilitation system expected to provide prompt, quality medical care, adequate income replacement and employment restoration services in the event of job injury or illness, that is one thing--and the record over the past 60-plus years proves the system has the ability to meet these purposes effectively and efficiently. On the other hand, if the system is expected to provide these same services not only for job-incurred disability but also for systemic disorders, the aging process and myriad other conditions that can affect the human organism--then that's a vastly different system dictating a massive upheaval of human and economic resources.

# AN INDUSTRIAL STRESS AWARENESS PROGRAM

Carlo Weber

Setting up a stress awareness, stress reduction, or stress management program in any organization is an art, rather than a science. As art, it deals with the individual, the individual organization, the individual in the organization, and the individual biases and idiosyncracies of the consultant who is designing the program. It is an art in the sense that there are no specific and scientific answers. It is an art in the sense that it is to some degree projective; one finds what one wants in the program. And finally, it is an art in the sense that it requires of both the consultant and the organization being assisted, a recurring series of strategic decisions made as the project progresses. In a sense, one flies by the seat of one's pants.

As consultants, we are totally aware of the ambiguity of the concept of work stress. We know that even in the best of studies, such as the Friedman and Rosenman Western Collaborative Institute Studies and the Holmes and Rahe Life Crisis Events Scale, there is little in the way of conclusive evidence from validating studies. We realize also that the science is essentially exploratory. But we do not really have the luxury of waiting upon science because questions are being asked now; the demand is now.

The concept of stress is also embarassingly popular. One can hardly go into a book store without finding at least a dozen titles on how to manage stress in all parts of one's life, with a great variety of tips on what to do. Some of these are applicable, but some are not. Some are helpful, but some may be positively harmful. There is no doubt, therefore, that the demand for some stress awareness program (and I am using "program" in a very loose sense) among all organizational systems is intense. Also, the demand cannot wait for experimental designs to be perfected, nor for intervening variables to be controlled in such a way that definitive conclusions about stress management and control in job situations can be derived.

In one sense, this exemplifies the chasm that has always existed between the academic and clinical worlds in our fields of psychology and psychiatry. The academic psychologist is searching for answers scientifically. He must therefore be indefinite in his statements. But the clinical psychologist cannot wait because patients are in front of him now, be it organizations or individuals, some steps must be taken.

This is by no means a criticism of the caution that science must exercise in pursuing accurate conclusions. But the lag between scientific development and organizational demand does exist, and organizational activity must somehow be designed to bring together the academic and practical aspects as much as possible. If anything has characterized the flavor of our efforts at Union Oil Company, it is that we are trying as best we can to bring together what we do know about stress scientifically with what we know about the individual in the organization. I see the consultant then as a strategist who works at different levels and employs a variety of strategies in order to achieve a union between his own objectives and the objectives of the organization.

The popularity of the stress concept serves as both an advantage and a disadvantage for the above-mentioned task. In some instances it is helpful. For example, we are all aware of the dramatic shift in the pattern of disease in the twentieth century from the communicable diseases, which were until this era the major lethal elements of society, to the so-called degenerative or stress-related diseases. The statistics are really quite undeniable. There were some million or so deaths from coronary heart disease in the United States last year, and there were estimates that 20 million Americans suffer from some form of essential hypertension. With that dramatic change, we in the health professions must respond, not with models borrowed from the communicable disease, or public health, which essentially is what we have done, but with models from the stress-related diseases. The popularity of dealing with stress is also due to the fact that organizations are not unaware of the rapid increase in the number of disability claims based on cumulative trauma or cumulative stress nor of the difficulty in establishing that the job situation did not aggravate stress-related disorders.

Consultants have always faced the problem of how to approach an organization. Any organization tends to resist when informed that the consultant is to assist with management problems. Also, approaching organizations by indicating that there are psychological problems among the employees invites immediate and decisive denial. But the concept of stress is acceptable because it is innocuous to management. Every organization is willing to acknowledge that there is stress among employees, because the organization is, after all, a highly entreprenurial, competitive business and there ought to be stress. This provides consultants an entree that they would not have had before, and the opportunity to do many of the things that he otherwise might not have been allowed to do.

The disadvantage of the popularity-of-stress rubric is that confusion about it continues to abound. So, an approach to a consultation in this area (stress, or the management of stress within the company) offers a curiously happy invitation to work with the company, but it is a mixed blessing.

The general stages one observes in initiating this kind of consultation are no different from those that occur in any kind of organizational consultation. First, there must be an entree; someone has got to extend an invitation. I am not selling stress management programs to organizations. I would, in some instances though, discreetly identify some aspect of a problem within the organization, about which I might have something to say; but the invitation must be extended by the organization itself. Thus, the problem of stress-related disorders provides a rather convenient entree to a great number of organizations.

Second, there is the creation of some kind of harmony between the objectives of the organization, the objectives of the unit within the organization which has extended the invitation, and the objectives of the consultant. These objectives may differ. The organization is most interested in either its service or its product. The individual or unit that invites the consultant into the company may have a totally different objective, which has to be defined. The consultant's objective turns about the potential of reducing the incidence of mental illness or stress-related disease among the employees in the company, or stated positively, of enhancing the quality of human life

within the organizational structure. Now, those objectives are never quite the same, nor would I suggest they need to be. A certain tension between objectives is probably good for the ongoing process of consultation, but at least the objectives should not be incompatible.

Third, once the objectives have been candidly discussed and some agreement reached as to where the parties stand in this relationship, sanctions must be established. Who wants the program, and why? Management may want the program for a variety of reasons. The capacity to announce the existence of a stress reduction or stress management program may enhance the organization's public image. In some instances, the program could then be a paper or image program, rather than a real one. We all know cases in which there were considerable discrepancies between what was asked in the original invitation and what the real agenda for the relationship proved to be. If the consultant allows himself to get into a situation in which objectives are not harmonious, it could indeed be difficult for him.

The fourth step is to establish one's credibility within the company. We have in many instances been able to identify the curious role of the consultant as a dilettante who comes in, drops his pearls of wisdom over a period of time, and leaves the scene. He also leaves a dilemma to be resolved after him though. As an example, we had many consultants at the Los Angeles Unified School District at one time. The consultants, being in most instances skilled psychiatrists or psychologists, were able to identify for the teachers, who were the consultees, what "Johnny's problems" were, and what the teacher needed to do in order to relate to "Johnny's problems." Usually it meant that, among other things, teachers had to spend much more of their time relating to Johnny. The question of what to do with the rest of the 40 children in the classroom during that time was not the consultant's problem, and consequently he left that to the teacher. There is too much danger of the consultant being that kind of dilletante. To avoid that, consultants must be willing to get their hands dirty, to get some work done, to establish some credibility within the organization, to be able to put their expertise on the line, and to show whether or not the idea or thing that they are proposing really does work.

Finally, no program can work without a built-in evaluation. Once the process has started, without going through the niceties of experimental design (because obviously we cannot control variables in a program of this sort), at least some kind of heuristic evaluation methodology should be involved. A six-month follow-up would suffice.

All of the above steps are essential in the art of establishing any awareness program in an organization. As an example, we can examine briefly the program that we are performing in consultation with the Medical Department of Union Oil Company. This is not a report because we have been working with the Company only since January of this year (1978). Therefore, I can only outline what we have done, and defer to a later time discussion of any further prospects or conclusions.

The invitation from Union Oil Company was extended several years ago by its Corporate Medical Department. We spent a year discussing what our objectives were, which resulted in three sets. The obvious objectives that the company

has are profit and product. The objectives that the Medical Department had were both clinical and educational. It took a year to work out those objectives to some sort of harmonious arrangement between the organization, the Medical Department, and myself.

In order then to establish myself within the department, I had to provide clinical services. As referrals came, either from physicians within the Medical Department or from supervisors, we dealt with each case. Some had to be referred out because the department is not established to provide ongoing medical assistance to any employee. However, largely because a goodly number of referrals seemed to involve Type A personalities, there was the possibility of setting up preliminary stress management programs on an individual basis. These included a follow-up over a period of four to six months to determine: (a) whether the individuals were following the suggestions made; and (b) whether or not there had been any change in organizational behavior or in the alleviation of symptoms.

As credibility was gradually established, we began a series of presentations. These presentations were arranged through the Medical Department with various managerial groups. The groups included management, marketing representatives, the research division, workers in refineries, etc. The first thing that was obvious was that the presentation could not be the same for each group. No matter what you have to say, you must tailor it to the particular group involved.

Our presentations, for the most part, followed a similar outline, with a bias in the direction of the scientific aspect. We spent a good deal of time defining stress as clearly as we could. That necessitated some kind of review of the functioning of the autonomic nervous system and the endocrine system, however casually that was presented. We did this because, given the popularity of the concept of stress, it seemed absolutely essential to us that those going through our program understand why they were doing what they were doing. An indiscriminate application of stress-handling tips was not appropriate, because what is stressful for one person is not stressful for another. The perception of stressors varies from one individual to another. So, the program had to be geared to the individual.

Now, this quasi-scientific approach generally is received with some reluctance. We have given many workshops, not only at Union Oil Company, but elsewhere, on stress management and reduction. The evaluations are always the same. The part that everybody wants to hear more about is "what to do about stress." There is a great deal of impatience with that portion of the program in which we attempt to present what we know scientifically about it. People want to get down to the solution of their individual problems. But too hasty an inclination to respond to that impatience leaves one, I think, in many awkward situations. So, our presentations remained scientific. We were explaining what stress was, and making distinctions which we felt were important in terms of ultimate practical application.

We feel that this patience is paying off, and the long-range effects of this solid base will exceed the benefits from a gadfly program. We distinguished between stress, as intra-organic, and stressors, which are extra-organic. We said to both management and employees of the company that stress is within

them, being essentially the wear and tear on their systems. Stress, we insisted, is not one's mother-in-law or kids; it is not one's job, the employer, or the supervisor. Stress is what happens in us as a function of how we perceive those people and events.

The practical reason for this explanation, apart from its scientific accuracy, is that if stress is intra-organic, we can then conclude that we have some limited control over it. The responsibility for what we do in the face of a perceived stressful situation is within us, even though we have limited control over both perception of stressful events and how our bodies respond to them.

We felt that this aspect was particularly important in any kind of program because one of the psychological correlations that has been found to accompany the experiences of stress consistently is the sense of powerlessness. It is the sense of being trapped, of having no options, of not being able to do anything about the situation. What we are trying to communicate is that if, indeed, stress is intra-organic, one is not powerless. There are options, or at least the perception of some options. The idea of options produces some interesting stress-coping theories. The options, for example, need not be real. The feeling of being able to do better somewhere else, whether that feeling is accurately founded or not, reduces the experience of stress. There are further corollaries or consequences from a distorted perception of what one's options may be, but that is another problem. With respect to the stress cycle, the sense that one has options, that one is powerful, whether that sense is true or not, is functional.

Further corollaries to this approach include the idea that stress is obviously unavoidable. There is no stressless life; and thus, the Selye distinction between distress and stress. Some stress is essential for the stimulation of intra-organic systems affected. Stress-related disease is not the function of the intensity or frequency of stressors, but rather the failure of the organism to restore itself to equilibrium; or, in Walter Cannon's phrase, homeostasis--after the stress has been experienced. Everyone experiences stress. The stress-related diseases, I think it can be said with reasonable accuracy, are a function of the failure of the body to return equilibrium after the blood pressure is up, after the heartbeat has increased, after the blood has been circulated from the abdomen to the brain and elsewhere, after sugar has been extracted for the muscles, and so on. The body normally restores its own equilibrium. The failure to restore equilibrium, either because of the continued perception of stress as unending or because of malfunctioning of the autonomic nervous system is associated with stress-related disease.

Thus, we presented to the people in these programs a stress cycle in which there were three major points of intervention. The first is the stressors themselves. Identification of the stressors requires a very careful discernment of what the stressors really are. The Holmes and Rahe studies suggest that the stressors in one's personal and social life probably exceed the stressors in one's occupational life. Yet, in many instances, it is very easy to identify occupational stressors as the culprits in cases of stress-related disease.

One must also be aware of the fact that the areas of stressors are not unpenetrable. Personal stressors can be brought to the job, and vice versa. So, identifying the actual stressors in an individual's work, social, or life history has to be done with great care. One can waste a lot of time eliminating those events which are reported to be the stressors, but which may actually not be. I think Dr. Chadwick's paper suggested the importance of taking care with self-reports. I have recently looked at many MMPI profiles for employees in large organizations, and apart from the fact that the clinical scales are characteristically benign, there is one other factor that I don't think has been reported very often, namely, that the validity scales strongly suggest that employees do not report what is wrong because they are trying to look as good as possible on the test, even to the extent that the clinical scales are rendered very difficult, if not impossible, to interpret. That phenomenon is undoubtedly present for the individual self-reporting stress.

The first stage in the management of stress, therefore, is an accurate and candid identification of what the stressors really are, and that is not immediately perceivable on the basis of what the manager or the employee reports. There has to be a much more careful and honest analysis if accurate results are to be attained.

The second point of intervention is obviously the area of perception. What is this individual's personality style? Is he a Type A, or more classically, is he likely to be a migraine, GI, cardiovascular, or respiratory responder? There is a great deal of literature on kinds of personality profiles which seem to be correlated to those physiological responses. We look first then at personality, and then in light of that, at the manner in which the individual perceives his job, his work life, his family, his social and physical environment, etc.

The third point of intervention involves the utilization of those techniques which are directed to the restoration of homeostasis once stress has been experienced. These include relaxation exercises, breaks, physical fitness programs, yoga, transcendental meditation, biofeedback, and other stress-reducing measures.

Our program, then, first attempts to enter the organization in a suitable and harmonious way and develop credibility within the organization. Through the use of various presentations, we attempt to provide management and employees with a model to cope with the stress that they experience. We emphasize identifying the stressors and also identifying the kind of perceptions that the stressful individual has of himself in his environment. Finally we utilize, to the extent that our resources allow us, the various techniques which we now know for facilitating the restoration of bodily equilibrium.

Unfortunately, I would say we are not far into this procedure at this time. We do not have a complete program worked out. It is much too early to be able to clearly identify outcomes, but this stage of the program within the Union Oil Company seems to be successful. Follow-ups on those who have filtered through the Medical Department on the basis of some stress-related disorder or some stress-related, performance-impeding problem are generally positive to date. At the end of the first six-month follow-up, there has been an

amelioration in the conditions of all but 2 or 3 of the 25 employees with whom we previously had contact. Again, I want to reiterate that this is not yet a full-fledged program. It is an approach, and it is presented only in terms of the strategies employed in introducing a stress-awareness program to the corporation.

# AN ACTIVE EMPLOYEE ASSISTANCE PROGRAM

Jack Guest, MPH

I would like to use the concept of mind set, to change your mind set once again from the theoretical to the practical. As a consultant, my job is out in the field, dealing with day-to-day problems as they arise. My guess is that a lot of you have the same problems. You are out on the job meeting various kinds of problems that may be a result of stress. We do not have a stress reduction program at Hughes Aircraft Company as yet, although I think that an extension of our Employee Counseling Program might very well be the next logical step. What I hope to cover in this discussion is why we have a counseling program at Hughes, the steps involved in that program, and how I work with supervisors to help them solve problems that are perhaps the result of stress. Also, I would like to discuss some of our results because I think they are impressive -- at least to our management.

First, I would like to clarify what "Hughes" is. We are not part of the regular Hughes empire, or Summa Corporation; we are part of the Hughes Medical Foundation and we are large. We have 42,000 employees, one-third of whom are hourly, two-thirds of whom are salaried. We have 15,000 employees with one or more advanced degrees. We are a high technology organization; we build satellites, radar systems, and missile systems, among other electronic products.

Why then do we have a counseling program at Hughes? Because we want to identify problems that our employees bring to the work setting and assist them in solving those problems. There are two reasons we do this. The first is increased productivity on the part of our work force. The second is that we have valuable employees. When we say that our employees are our business, we mean it, and therefore we want to retain them. Consequently, rather than fire employees who have problems, we try to help them deal with those problems. I would add that there probably are some companies that don't have that philosophy. I don't believe that employee assistance or counseling programs can work unless you have top management support which enables you to do the kinds of creative things that Hughes allows us to do with our employees.

The steps involved in our program is the next area I would like to discuss. They are identification, confrontation, referral out, and follow-up. Let us look at each one of these in a little more depth. First, we must have some way to identify that problem. At Hughes we are very conservative in the way we identify problems. We do it only in two ways. The first is self-referral. The employee knows he has a problem, knows about Employee Counseling, and comes to us for help. My guess is that many of the stress-related problems that we work with come to us as self-referrals. The second way is a supervisor referral. Two-thirds of our people come as supervisor referrals. In most of these cases, the performance of the employee has deteriorated and the supervisor is concerned. He follows the usual supervisory procedures, which do not work in this instance. Performance continues to deteriorate, and Employee Counseling is called in. I mentioned that we are conservative,but we are conservative for a reason. We want to be absolutely sure that we have a problem. We do not want to deal with personality differences between the

employee and supervisor. Our Employee Relations people deal with those problems. We want to know that something external is causing the deteriorated job performance. We check this out with documentation.

I would like to discuss the kinds of things we ask our supervisors to document. Obviously, attendance is one. Attendance, however, tends to be a better indicator at the bottom level of the company than it does at the top. At the bottom, we have greater control over our employees. At the top, paperwork may not get filed. You might open up a file that looks clean but probably isn't so clean. When we get into upper level management, we look for some other kinds of things like reliability. Hughes does a lot of team work, projects where we will have three engineers working on a program. They are supposed to come together on November 15, each one with a piece of the project. They clip the pieces together, and it works. Well, if November 15 arrives and they only have two pieces, that means a delay in whatever it is that we want to get on the road. So, we look at reliability in this instance.

Production is another area; but sometimes it is difficult to get a handle on production. At our production facilities, it is fairly easy in some aspects. If somebody is supposed to produce 50 widgets and they are only producing 25, we have a production problem. But, we have some other kinds of plants, such as the one out at Malibu, which is a kind of think tank where our people think.

In any event, we have to get a handle on performance one way or another. We will work with supervision to see what kind of objectives they have for an employee and whether the individual is fulfilling those objectives.

Interpersonal relations is another area that we look at. Maybe we had an employee who used to get along with everybody in the department and suddenly he is edgy and having arguments. Things like that indicate that something may certainly be wrong.

Then, of course, there is sick leave. Sick leave is one of the better indicators. We have 12 days of annual sick leave plus what is called extended sick leave. You show me somebody who has used all 12 days of sick leave, and somebody who may have used some extended sick leave, and I will show you somebody with problems. Now, it might be a very legitimate problem, such as a chronic illness that requires the employee to be off that amount of time. But in any event, we ought to know why that employee has to be off 12 days per year.

Let's move on to the next step, confrontation. Confrontation is the most difficult step in our program. It is tough for a supervisor to call an employee in and say, "I am dissatisfied with these five specific things. You have to take corrective action, you have to improve." We have quite a stable company where all kinds of interrelationships are present. The supervisor may have been the best man at this employee's wedding, so it is a very difficult step.

While confrontation is difficult, you still have to develop a philosophy that enables you to confront. Mine is basically simple: every human being has a right to know exactly where he stands. If he is doing something wrong, he has a right to know what he is doing wrong. He has a right to know what you are

going to do to him if he does not take corrective action. If you think about it in this way, it makes confrontation much easier. Also, when you realize that this is the method we use to motivate employees to get the help that they sometimes desperately need, then it becomes even more meaningful.

We also use discipline in our confrontation. We follow our labor contract to the letter of the law with our hourly employees. We also discipline our salaried people in much the same manner. We use an oral warning, a written reprimand, disciplinary leave without pay, and discharge. You may say, "you are dealing with illnesses and problems, and you are going to punish people for having those problems." That is not our intent. Our intent is to establish credibility. People with many of these problems, including alcoholism, have been threatened by others including their supervisor. "Next time you are not able to perform, I am going to do this, or I am going to do that." We don't threaten people. Promises, yes; threats no. What we do during the oral step is to say, "Hey, if you don't take corrective action, if your performance doesn't come up, we are going to give you a written reprimand." Most alcoholics will think, "They won't do that. They have been warning me for a long time and they will warn me again." Then, of course, performance doesn't go up, and what can we do? We give him that written reprimand. We don't say in the reprimand that he is an alcoholic, we deal with what's wrong with his performance. He thinks to himself, "My goodness, if they have given me that, they will give me a disciplinary leave without pay. That is the next step." Then we do it if the problem still exists. While in most cases people come into Employee Counseling with their problems during the initial step, we will go all the way, if need be.

Let's move on to referral out. We are fortunate in Southern California in that we have about 1,300 agencies that deal with problems that we uncover at Hughes, and we are able to refer out to those agencies. I don't like to refer employees any place I haven't been myself, so I visit agencies. I like to get to know the staff, find out what the programs are all about, and then go from there.

The last step is follow-up. Mental illness, drug abuse, and alcoholism are chronic problems. These are problems where people may indeed have a relapse, so follow-up is absolutely necessary. We follow up in three major ways. First, we follow up with the agency to which we have referred to make sure we made an appropriate referral and to make sure that some plan of recovery has been laid out. Next is the employee. We are looking for a change in that employee, and if we do not get it, we may need to try some other facility or some other resource.

Then, of course, we follow up with supervision. Here our goal is increased productivity, and there have been a few occasions where we believed that we dealt with the individual problem effectively but performance did not go up. We need to know from the supervisor if performance begins to go down again. We want to know as soon as possible now so we can get involved right away.

Let's move on to some of the results. Fifty-five percent of our caseload is alcoholism. That may be astonishing to you, but I can say that at Standard Oil and some other companies that have programs, it runs about the same. We get 70 percent recovery results. I used to run an alcoholism treatment clinic

in northern California. I don't think that our recovery results were any better than 20 percent. Why do we get 70 percent in industry? Very simple. In the treatment clinic I was getting social welfare referrals and probation referrals. They were mostly late stage alcoholics. In industry, early and middle stage alcoholics are being identified. They still have their families, so they still have a lot to work with, and thus, recovery rates go up. Eighty-four percent of our caseload are employees. Sixteen percent are family members. We are very much interested in family members because the family member with a problem can have an impact on the employee's ability to do his job. We want to help that employee if we can so we try to help his family The average age is 45. If you go to any school of business management, they will tell you that people around 45 are right in the middle of their most productive years. Those are people we don't want to lose.

When you combine average age with the next statistic, it becomes even more significant. The average length of service at Hughes Aircraft was eight years at the time I did this survey. Because we deal with problem employees and 55 percent of our caseload is alcoholism, the average length of service in our caseload should be something less than eight years. It turns out to be 12 years though. If you look at these two facts, 45 years of age with 12 years of service, we are reaching long-service employees who are theoretically in their most productive years. These are people we really cannot afford to lose.

When the program was first started, a survey was completed and a great deal of data was available. Finance looked it over and made an estimate that every alcoholic on the payroll was costing Hughes Aircraft $4,000 per year. At that time we estimated that 6 percent of the work force were alcoholics. With 28,000 employees at the time, we were losing $7.2 million due to that one problem, excluding all of the other kinds of problems that have been discussed. If you accept our recovery rates with that one problem alone, we are saving the company $1.2 million annually. Perhaps even more significant for those of you in labor relations, we have recommended hundreds of disciplinary actions, including about 100 discharges. We have never had a grievance filed by any of our labor unions on any recommendation that we have made because labor organizations and Employee Counseling have the same goals as does management. We want to retain that employee, so we don't have an adversary relationship. But, more importantly, we documented. We have touched all the bases, we have been fair, and we have treated everybody exactly the same. If someone were to file a grievance, there is no way he could win.

I have mentioned that we have discharged almost 100 people. We have discharged blacks, chicanos, women, and men over 40, which are all protected classes. They could all file a charge against the company, but we have never had a charge filed against Hughes Aircraft on any discharge we have recommended. Why? The documentation and the fact that we have been firm and fair and treated everyone alike are the reasons.

One of the more interesting things about our program is that in the beginning one of our senior scientists said, "Well, I don't know whether we should have a program like this at Hughes. You know we have a lot of bright people here, and probably if we have a program, it should be for 'those people'." He meant

the hourly employees, because the Ph.D.'s and the people with Master's degrees are much too bright to have problems like mental illness and alcoholism. We suspected that he was wrong, and so we collected some data. The data indicate that if you break down our 42,000 employees by classification and you do the same thing with 2,200 cases we have worked with, you find that we have as many problems as a percentage of the total in the top of our organization as we have at the bottom That should be no surprise since we are dealing with human beings and they are all subject to the same kinds of problems.

I think everyone wins with our kind of program. The employee is the biggest winner because he has the most to gain. He still has his job, and his family, and he is still a productive member of society. Supervision also benefits because we are able to solve a problem that the supervisor by himself is not equipped to solve. We have increased productivity in his department and saved the company $1.2 million annually in the process.

I would like to carry the program's benefits to the community. If all corporations, had programs like this one, and eventually moved into some stress prevention programs, what would we find? At Hughes we have 700 treatment-related families where the employee is still with us, still working, and still supporting his family. Without a program, eventually he would have been unemployable. When he is unemployable, the male breadwinner usually has to leave and the family goes on welfare. Alcoholism accounts for one very big chunk of our welfare budget, and we all know how large that budget is. Then the alcoholic may well wind up on skid row, and what do we do there? We arrest him, book him, jail him, let him out, arrest him, book him, and jail him again. That is a very expensive process. Then, of course, when the alcoholic really gets bad, what do we do? We send him over to County-USC Hospital. I don't know what the latest figures are, but it probably costs about $240 a day. Who pays it? Well, you and I pay it. So I maintain that if companies, large and small, would work together or buy the social services available in the community, we could have a tremendous impact on some of our most serious social problems.

# STRESS AND CONDITIONS OF WORK--A SOCIO-TECHNICAL APPROACH TO LARGE ORGANIZATIONS

Joel Fadem

I will present in greater detail some of the findings from a study touched upon earlier, the "Air Traffic Controller Health Change Study" conducted by Dr. R.M. Rose and associates of Boston University Medical School. The findings were reported in June 1978. Some of the conclusions are most germane to the approach my colleagues and I at UCLA are taking to a project with the Federal Aviation Administration (FAA) which I shall soon describe. Some of the Boston study's findings are remarkable, but first let me give you a rough idea of what that investigation entailed.

The study lasted 3 years and covered 416 air traffic controllers from small and large facilities in the New England and New York areas. Of the 416 subjects who were in the study from the start, 388 remained to the finish--an acceptable retention rate. The principal goal of the study was to determine the nature and extent of health changes in air traffic controllers and by what characteristics these changes might be predicted. There was an extensive array of data collection in this study. It was calculated that over 2,500 man days of observation took place, including data collection in the various facilities over 5-6 hour periods at a rate of every 20 minutes. In total, there were approximately 40,000 individual observations made while controllers were actually working.

The data were quite extensive--medical, psychiatric, psychological, and physiological--and ran the gamut of research techniques available to the study team. The Boston study by Rose et al. (1978) is the most comprehensive work in this area that the FAA has ever conducted, and probably one of the most impressive studies of stress and the environmental conditions contributing to it that have ever been undertaken.

From all the data, the Boston team was able to diagnose old and new cases of hypertension, along with occurrences of major illnesses, such as peptic ulcer and diabetes. The vast bulk of the physical health changes, related to short term respiratory illness and accidents, were associated with occupational disability in moderate degrees. The major clusters of predictor or risk variables included stable personality characteristics in order to determine whether or not particular traits raised one's risk of developing some kind of physical or psychological disability. The Boston team was particularly interested in the controllers' attitudes and perspectives about their work; in other words, their feelings about their ability to cope with the diverse demands of their work, both on and off the job. The team was concerned with controllers' feelings about the human cost of working in this occupation: its interference with the rest of their lives, their feelings and investment in their work, their concerns about burn-out, their ability to bounce back after periods of being away from the scopes, anxiety, etc.

The major category of predictors related to responses to the work itself--actual responses during the act of controlling air traffic. While the men

were on the job, the Boston team measured their blood pressure, endocrine responses, and various types of arousal levels. Workloads were also very carefully recorded. The Boston team was able then to compare controllers with respect to their work load, as well as their subjective responses to work and any changes in overt behavior, blood pressure, hormone levels, etc.

There were basically three clusters of findings. The first confirmed that the largest single chronic illness condition among air traffic controllers is hypertension. This came as no surprise to the research team. Findings in this study paralleled previous reports which documented the increased incidence of hypertension in controllers as compared with other individuals. Using a very rigorous definition of hypertension, the team found that about 32 percent of the men entering the study already had borderline or definite hypertension. In addition, 9 percent (36 controllers) developed these conditions over the course of the study. The Boston team concluded that there was an increased risk of hypertension among the air traffic controller population.

The team did not say that air traffic controlling actually caused hypertension. They were very careful about making that distinction, although there is clearly a strong association involved. They recommended that an appropriate conclusion might be that air traffic controlling represents a risk factor interacting with other risk factors, because there may be a variety of biological and perhaps genetic causes of predisposition towards hypertension. Clearly, in this occupation, it was a key chronic illness.

It is also important to note that hypertension had no relation to performance. People who had hypertension were neither better nor worse in terms of how they did their job, in terms of how they coped with their workload, or in terms of how they were rewarded or punished.

The second major cluster related to the annual rate of mild or moderate illness, which primarily consisted of respiratory illnesses. The average number of acute health change episodes per controller over that period was 2 1/2 per year although there were wide variations within groups. These illness episodes were primarily accounted for by upper respiratory infections and more moderate injuries due to nonspecific viral disorders, and acute gastro-intestinal syndromes. Although the team concluded that the occurrence of these mild or moderate illnesses did not present a significant risk for future mortality, the illnesses were associated with significant numbers of days of restricted activity and they could be expected to be an increasing source of absenteeism in the future.

The team couldn't be as precise in their assessment of the third cluster concerning psychological health. They used the state of the art methods of diagnosing psychological and psychiatric health changes, and tried to contrast those who did with those who did not develop various types of psychological and psychiatric illnesses over the course of the study. Over half of the men in the study had at least one psychiatric problem, as defined by the team's criteria. Most of these problems did not receive professional treatment.

The controllers who developed psychiatric problems rated significantly lower in satisfaction with their work and in their ability to discharge tensions following work. They also had an increased tendency to cope with job stress by drinking after work, and showed lower amounts of coping by activities such as physical exercise.

Thus, in many ways, the measured outcomes for people with psychological and psychiatric health changes were very similar to those for people who experienced mild or moderate illness. This prompted the researchers to ask whether they were really looking at the same people. Was this the same group of people who became physically sick? Was there, essentially, one sick group and one healthy group? The answer was negative. In fact, there were three separate groupings of people, overlapping to some degree but essentially distinct. Therefore, the men who had or developed hypertension were no more likely than others to have either mild or moderate illnesses or psychiatric problems. The following quotation from the Boston team's tentative conclusions is illuminating in this regard:

> This finding supports the specificity hypothesis in psychosomatic medicine which emphasizes that different individuals will develop different problems despite the fact that they may be exposed to similar difficulties or similar problems in their psychosocial environment. For psychiatric illness and mild to moderate illness, several common themes clearly emerge. The work environment seems to be implicated in the risk for developing health change more than the work activity itself. Men who developed more mild or moderate illness or who developed psychiatric problems did neither more nor less work when observed during the field studies. They spent neither more nor less time on position nor did they control more or fewer planes. It was also noted that they were not considered less competent by their peers, although they may have been less frequently chosen as amicable or less likely to be nominated as an ideal team member. Because of these findings, one may not conclude that individuals who develop more mild or moderate illness such as flu or psychiatric problems were poorer controllers or did less work...One is led to the conclusion that these individuals are more at odds with their work environment. They are often highly invested in being controllers although they find themselves less able to discharge tensions associated with their work. Hence they find that functioning as controllers is associated with an increased cost in terms of their personal lives and psychological health. This finding of "it's not so much what they are doing as the context in which they are doing it" holds definite implications for changes that might be considered in the work environment to reduce the risk for future morbidity.

I should also mention that the particular population of controllers that was studied had a lower rate of disqualification than the comparison group. Therefore, these findings were probably on the conservative side.

The Boston team assessed the predictors of burn-out, as they had defined it, and found that those individuals who later developed burnout scored significantly higher on a number of positive factors early in the study. These individuals had more vigor and friendliness, less anxiety, and reported

a higher tension discharge rate. They also coped less by drinking. In other words, they did not start out as dissatisfied or as having anxiety. Rather, they were committed and, from their own estimation as well as that of their peers, they were functioning as well or better than others. It is notable that there were no differences in workload between the group that experienced burn-out and the larger group which did not. The burn-out group did not have physical health deterioration per se, though it is quite possible that if this study had continued, some kind of physiological deterioration could have developed as a result of the study itself.

Another quotation from the Boston study can serve as a summary of this remarkable research:

> Our findings are in many ways different from our expectations, especially with regard to the predictors of psychiatric illness and mild to moderate physical health problems....These findings suggest that it was not so much what they were doing but the context in which they were doing it and the attitudes and feelings they had about their situation that influenced their risk for health change...We had expected that the workload itself during field studies would have stronger predictive power than it turned out to have. The consistency of these results, which might be summarized as the alienation controllers experience from their work environment, suggests that changes should be made in this environment and in the way it is experienced. We believe that dissatisfaction with FAA management policies are a significant problem and represent part of the negative set associated with an increased risk for health change. We also believe that some of the divisiveness that the controllers experience may in part derive from union-management interactions. Thus...some of the alienation and divisiveness controllers often experience may be an unexpected and unwanted side effect of the adversary relationship between union and management....Our interpretation is that this is not solely a matter of working hours or of pay, but that there is a need to improve the communication between management and individual controllers and to attempt to limit the adversary nature of their relationship. It is our view that this could be accomplished by a cooperative effort between the FAA and union management, and that individual controllers would significantly benefit from such a reduction of controversy in their work environment.

The predictors of hypertension were distinct and, in fact, the Boston team's recommended ways for overcoming hypertension were different from those proferred to deal with the environmental issue. The people in the hypertensive group did not feel alienated toward their work. This suggested that there may be more individually-based, as distinct from organizational, remedies for reducing hypertension or for coping with it within acceptable levels. However, with respect to the other mental and physical health problems studied, the Boston team was recommending a hard look at the work environment in its broadest sense. This serves as an appropriate backdrop for the project I now wish to describe.

The Boston study began in 1975 and was completed in June 1978. We at UCLA knew that the study was going on, although we hadn't kept in touch with it. We were, in a sense, pleasantly surprised to see that the recommendations from that study called for a broader frame of reference to address wider organizational conditions, as distinct from narrower approaches to the work itself and particular individual differences. The origins of the project I am going to describe were interrelated. They all converged in late 1975. A high degree of technical progress, complexity, and sophistication has developed within the air traffic control part of the FAA national air system. High-level managers in the FAA were becoming concerned that present attempts to deal with these changes in terms of the human factor were not satisfactory and that technological solutions to work problems were not always providing the most desirable results. Given plans for further automation, there was an increasing awareness of the national air systems' vulnerability, and its crucial dependence on people. One FAA manager characterized this as the contrast between hardware versus "skinware." The word "skinware" became one of the rallying calls in this project for those concerned with mitigating the social impacts of technology.

A younger work force was emerging in the FAA, and there were issues which had to be raised in connection with the work force of the future--what kind of people would the FAA wish to have, given the new technological environment? What kind of generation gap existed in the agency between those who worked the old manual system before the days of advanced radar and the young people who entered with automation as their first work experience in the FAA?

A great deal of anxiety is expressed by younger air traffic controllers who operate the present highly-automated system. In short, they fear system failures. Many of these individuals lack the capability to revert to the old tried and tested "manual" ways. So, while the scopes are humming, the displays are up, and everything is right, there remains a latent fear that the system may go down. And when the displays suddenly disappear, controllers don't know when they will come back. Meanwhile, they, the controllers, must act. This requires the development of a reliable mode of crisis intervention to cope with temporary system failures. Therefore, the automation problem is a very emotion-laden as well as a technical issue.

There were vexing problems in the area of labor-management relations which reflected the tougher climate existing in the public sector. Some of the FAA's upper-level managers favored the idea of exploring areas of common ground between the agency and the unions in an attempt to jointly solve problems outside the bargaining arena. Also, from a management viewpoint, they wished to move the agency more toward an anticipatory posture, rather than a reactive one. This would require an improved capability for continuous long term planning, especially in connection with emerging issues among the agency's diverse work force.

Subsequently in 1976, top-level management in the Air Traffic and Airways Facilities sectors of the FAA convened a task force to consider how to proceed with tackling some of these issues. They served as a steering group for two subgroups, consisting totally of line managers, journeymen controllers, and technicians, covering a salary range from GS-8 through GS-15. The subgroups had ten people each. One was called the Technology Group; the other became

known as the Quality of Work Life Group. Both were composed of representatives from the three FAA unions. The overall purpose of these two groups was to learn and experiment with new tools--new approaches and concepts--which would help them diagnose FAA problems in organizational terms, both with respect to the agency as a whole and, more immediately, within local operating facilities. In doing so, it was hoped that the groups would be in a better position to generate options for changing the agency organizationally for the purpose of improving both the effectiveness and the quality of the working life of its employees. These potential options included not only technical ones, but social as well. Among the key factors upderpinning the expectation for options was FAA employee participation from the bottom ranks upwards of the FFA.

In terms of the dynamics of this project, I shall just say that an extensive training program was designed for the two subgroups by our group at UCLA. The training is based on an appreciation of organizations in systems terms. Through this approach, interdependencies between organizational units can be traced in a systemic way, and not merely in terms of symptoms. New linkages can then be formed to: 1) improve the service mission, e.g., actually getting the work done, or delivering services to the aviation public; and 2) provide more effective social mechanisms through which to undertake work. As part of this, important outcomes also included the reduction of "hidden costs" such as occupational stress and illness, job dissatisfaction, and destructive forms of conflict.

A guiding principle of the training program and its application was that processes of change had to be congruent with the actual content of change recommendations. That is, the UCLA group acted in the role of trainers, not outside experts with solutions. Members of the subgroups knew their own business. We could provide them with concepts which might help them assess, change, and evaluate results at a number of demonstration sites. At these sites, the subgroups went through the analytic exercise of conceptually taking apart the technical and social systems of air-traffic control rooms and airways facilities stations. A key part of their data collection involved extensive participation of employees at those facilities. This was an attempt to really get down to the nuts and bolts of the relationship between activities undertaken to get work done, and the social processes and support functions which bind air-traffic control technology--both hardware and procedures--together.

The Technology Group was charged with looking at new technology, as well as existing systems. Let me briefly discuss one example of the type of issues they addressed. In the highly automated environment toward which everyone in the FAA is convinced the national air system is evolving, it is vital that controllers have the capability to revert to appropriate manual methods when the automated system fails. This is important even though air traffic control will progress toward more machine control over decisions. You may wish to question this move to automation of decision making, but that is the logic which currently is the driving force in FAA planning. With greater machine control over decisions, the air traffic controller will be relegated to a monitoring role. There is a good deal of research which confirms that man is not a good monitor. For example, he may fill in information gaps (such as those apparent in viewing the display screens) based on several psychological

factors; his mind may wander from boredom; etc. Yet at the same time, there remains the need for crisis intervention and decision making by the controllers based on a thorough understanding of the new system. Therefore, they are in a dilemma. The controllers, on the one hand, will be cast in the role of monitors, and on the other, they are also decision makers with the need to respond quickly and intelligently to random crises.

The net effect, as far as the Technology Group could see, is that for the next generation, automation will accentuate the very problems which now beset them--boredom, frustration, peaks of very intense activity and periods of low activity, fears of system unreliability, etc. The Group concluded that the FAA was driven by a technological force which has enabled it to succeed in the service mission, but the FAA has not been nearly as successful in its mission with respect to human resources--"skinware."

The FAA has reached the point where newly-available technology, though usable, may not be practical to implement because of its adverse effects on employees. With this in mind, the Technology Group developed and recommended a framework for screening new technology through a human impact "filter." That is, quality of work life considerations are to be one of the key filters in the technology assessment process. Although human factors engineering and ergonomics are a part of this, the assessment is much broader. During the past two years, the Technology Group tested this assessment process with existing technology through retrospective analyses. They are now actually testing out this process on a new major air traffic control technology destined for use, and there is a good chance for modification based on quality of work life considerations.

The second Subgroup, the Quality of Work Life Group, undertook an intensive application of what we call the "socio-technical" approach at five facilities around the country. They also conducted individual and group interviews with 2,000 employees throughout the FAA. This group came up with a working definition of the relationship between quality of work life and productivity. Their definition included the idea that the quality of work life was a function of the meaningful participation by all employees at all levels in making decisions--socially and technically related, as well as procedural--that affect them. That sounds very simple and perhaps idealistic, but in the case of the FAA, employee participation has been a vital element for improving the process for making decisions and changes at the local level in the facilities involved.

The first order of business for the task forces was to become exposed to new concepts and tools, to try them out and, if they approved of them, to recommend them to the agency. It was basically a learning process and I don't want you to come away with the feeling that massive changes are now brewing. I mentioned at the beginning that the Boston group make their report in June of 1978. These two subgroups also submitted their recommendations to the FAA in June of 1978. Their recommendations were endorsed and the technology assessment process was adopted as agency policy.

It is now an agency order that new technology be subjected in advance to this assessment--a key element of which being the human factor--to render a global reading of the relative acceptability of that new technology. This is

intended to increase sensitivity to the role that people play in holding our air traffic control system together, and to qualify our reverence for the magic of machines and electronics. It is not machines but people who are filling the voids created by technical systems, procedures, and bureaucratic rules. Therefore, the technology assessment process, carried out by a team of representatives from all levels of the FAA, will be applied in an effort to "head off at the pass" significant dislocations, both personal and social, which could be experienced by the work force with the introduction of advanced forms of automation.

The next phase of the project is the creation of another steering committee, more broad in scope, which will include Engineering and Development, Aviation Medicine, Administration, and other FAA departments, as well as its Air Traffic and Airways Facilities components. The agency employs 56,000 people and the majority work in the latter two areas. The subgroup to be appointed will be broader based in how they attack the problems of quality of work life, productivity, and occupational stress. Stress, of course, is an important concern in this project. However, it is viewed more as a by-product of organizational influences rather than individual-based inadequacies. Also, when the next project phase begins in January, 1979, a concerted effort will be made to include union representation at the steering group, as well as at the subgroup, level.

One of the other outcomes from the work of the subgroups is that the socio-technical approach to organizational design will be introduced into the curriculum of the FAAs' management training school in Oklahoma City, where all prospective and existing managers are trained. This approach will be one option for use as a diagnostic tool with which to solve problems, one which involves employee participation and a very hard look at the relationship between social and technical factors at the work place.

The Quality of Work Life Subgroup also recommended that the sociotechnical approach be used as a tool for evaluation, that is, as a method for evaluating the performance of an operating facility. This is in contrast to the current procedure of sending a team from Washington with clipboards who perform what might be best described as a ritualistic checkoff of details which do not easily lend themselves to fruitful application. Because the basic purpose of evaluation is correction, these task forces recommended using more participative methods in the evaluation process. In other words, employees and managers would join with the outsiders in conducting a deeper evaluation of their own facility in order to come up with weaknesses, strengths, and programs for improvement. Thus, you can see that there is a bias in this scheme towards pushing decision making and accountability to the lowest possible levels of the organization. It is an active attempt to do just that. The FAA, like other government agencies, is very difficult to change. This project is a very modest attempt to complement the bureaucratic method with better problem-solving methods and to open up new alternatives. It is much too early to tell whether or not the prognosis will be favorable.

I will close by quoting a phrase from E. B. White, who, in 1927, said something which is apposite to the entire field of stress. He predicted "a brilliant future for complexity in the United States." His statement about our unique obsession rings true. There is much we do not know about stress.

There are things we may never know about the determinants of stress and there are obviously dangers of scientism and the illusion of certainty in the pursuit of such an exercise. But we should use what we do know, along with what we value in human terms, as our point of departure for attacking some of the problems I have discussed.

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# LABOR AND MANAGEMENT COLLABORATE ON OCCUPATIONAL HEALTH

Jean Spencer Felton, M.D.

It has been mentioned at previous conferences on occupational stress and cumulative injury that there has been a collaborative relationship established between labor and management in the area of occupational health at the Long Beach Naval Shipyard. I am pleased to report that after four years of such a program, it still exists and is flourishing.

## PROGRAM INITIATION

The initiation of a new program in occupational health is always carried out with some difficulty. An experienced professional person joins an organization, and, although he has been engaged in the practice of occupational medicine for years, to the people of the working group he is an unknown, as is his staff, if he has brought new people with him. The burden of proof of competence and confidence lies with these newcomers.

A new program is stressful to management for it is not known which way it will head, or what its philosophy will be. It is stressful to labor, particularly if previous programs have not been successful. Naturally, the situation is stressful to the occupational health professionals themselves because they will have to test the environment in which they will be working and offering their services.

Let me tell you briefly about our Metal Trades Council, the labor bargaining agent at the Long Beach Naval Shipyard. The Council represents some 12 individual locals of the craft workers that make up the civilian force at the shipyard engaged in the overhaul and repair of craft from the Pacific fleet. The 12 locals elect their officers, some of whom represent them as officers of the Metal Trades Council, serving full-time in union activities. Their constituency makes up almost the entire caseload of the occupational health facility.

## ESTABLISHING A RELATIONSHIP

Early on in the program we requested a meeting with the presidents of the various unions and with the labor relations chief. We spent 1 1/2 hours in my office one day reviewing the past occupational health program and their concepts of the new program just being formulated. I learned months later

that the one action at that interchange which gave us credibility was the fact that we had taken extensive notes. They realized that their opinions were being regarded, were being noted, and that, in essence, someone cared. The next three months were characterized by a stream of workers out of the shipyard who presented the most unbelievable, unsolved problems. Our team worked with these employees, and at the end of about three months the rush suddenly stopped. We couldn't understand the change until we began to analyze the situation and realized that we were being tested. These employees were being sent in with the same difficulties which had been presented to our predecessors, but which had not been resolved by them. Now, in each case, action was taken which was definitive, helpful, supportive, and in some way was resolving the problem that was unique to that individual.

APPOINTMENT OF A MEDICAL LIAISON OFFICER

We experienced a second set of difficulties. For each problem we would get calls from three union people, each of whom would call the medical director, the associate medical director, and the chief nurse, individually. This kind of confusion couldn't persist, so an agreement was reached whereby the Council would designate a medical liaison person who would be the sole contact with the medical facility and a system of Triage was established. If the problem concerned policy, this man would meet with the medical director; if there was something of a serious nature, but not a matter of policy affecting the entire delivery of service, he would meet with the associate medical director; and if there was a problem of a lesser nature, like immediate medical care, he would consult the chief occupational health nurse.

From that point on to the present day we receive about five to eight telephone calls per day, and there are about two conferences each week. This has led to an extremely harmonious relationship between management and labor, and it is our feeling that this is the only way an occupational health program will function. If one does not have the union on one's side, working with one collaboratively, one can readily fail and recovery will be extraordinarily difficult.

MEET AND CONFER

On new issues, we meet on an informal basis and explain in some detail what we would like to do, such as change a procedure or introduce a different appointment system. This kind of session is followed by the "Meet and Confer" formal conference required under the collective agreement. This conference is usually attended by three or four of the union presidents, the labor relations representative, and our own staff from the medical department. With this action, the union officials have not been caught off guard, although when one sits down with them, there still is a good deal of noise and there is much questioning. But in the end, the item which is being offered is accepted; and the union people are prepared to go out into the shipyard and provide support when an official directive announcing a change of direction or a change of program is issued.

VALUES

Does this approach pay off? Let me give you just one factor of evaluation. In the four years that we have followed this procedure there has not been a single grievance submitted on a medical issue, while prior to this time such actions averaged two per month.

What are some of the other features of this working relationship? First, whenever the union has visitors from its international organization in Washington, from regional boards, or from offices here on the coast, they come to the medical director's office. We meet and give some impressions of the state of the art of occupational medicine at the shipyard. And when we have visitors, we invite the medical liaison person in so our visitor can meet with him. Everything is open and there is free discussion, and the union can give its view of the medicine-labor relationship.

ADVISORY COMMITTEE

A second element of this working relationship has been the establishment of an occupational health advisory committee with representatives of all the unions, in addition to management and other organizations. The members have been able to have a voice as consumers, so that those of us who are directing the program come to know their wishes and feelings about the services which have been presented. We have also been asked to participate in union seminars involving occupational health or asbestos-related disease, and we always accept these invitations.

One of the main things that I would suggest to you is that when a union representative--in our case it's the medical liaison officer--calls, be sure he gets a response. A telephone call, if there is no one in the medical director's office, should be answered as quickly as possible. The liaison officer is able to demonstrate that the medical department is going to do something for the employee, and when he can demonstrate his own effectiveness, he gains strength as an opinion maker and leader in his own organization.

Frequently, no particular action is needed beyond a response. One may look into the situation and even have to come up with a negative action, but at least there was a response.

OPERATING TENETS

If one considers a working relationship of this type, one must accept these tenets: First, the man representing the trade union is just as important in his organization as we are in ours. Second, he is never to be taken for granted. You cannot be sure, given a certain situation or a certain issue, of his opinion. Third, there has to be a constant nurturing of this relationship, for one cannot go on past performances. If you did something last week and you didn't do it yesterday, there goes your credibility. Keeping in mind that the representative is the opinion maker and that he confers with management on his own is an approach that can help diminish some of the stress in labor-management relations.

In a large, heavy industry there is a great deal that involves medical care. There are many potential occupational health hazards. All of you are perfectly familiar with the issue of asbestos-related disease. A good working relationship between occupational health personnel, labor, and management in such situations must be built on mutual respect. Then problems can be settled bilaterally before they attain out-of-proportion dimensions. We can explain the problem, and we can familiarize everyone with it in advance if there is difficulty in understanding it. And again, we can respond from our point of view.

SENSITIVITY RETAINED

There must be sensitivity to the feelings and needs of union officials. I remember a situation in which a meeting was called by personnel in our safety office in order to discuss with the union some issue concerning emergency medical care. For more than an hour there was the most intense, bitter wrangling between the safety officers and those individuals representing the Metal Trades Council. I heard later that there was going to be a repeat meeting, "and would you please attend." So we went, not knowing exactly what we would be facing. One of the people from the union asked two questions and the meeting was over in five minutes. What actually happened was that when the safety officer had called the meeting the safety department had sent over the most junior member of their staff. There was a mismatch between the level of that particular safety analyst and the head of the union and his staff who had been present. The union people wanted equity in positions when they met and conferred.

We hold orientation X-ray sessions with our employees on whom we have positive chest findings indicative of asbestosis. We show them the X-rays; we explain what the disease pattern is and what the disability is, if any at all. Our word, even after four years, frequently is questioned. The union members will go back to the Council headquarters and check out what we say. The union representative will relate what we have said in previous meetings and the employees get confirmation and support to face up to the medical message.

Here is an example of how not to go about establishing a working relationship. The medical director at one installation thought he would try our system. He had heard one would have to meet with the union. So he brought all of the union presidents into his office, gathered the six people around him, and announced, "O.K., I have brought the union in, you are in my office. Gentlemen, goodbye." And he left. I assure you, that is not the way to establish a good working relationship.

How do you get over the usual adversary situation that exists between occupational health professionals and the union? Can you be comfortable in that relationship? Can you be as comfortable with the union as you can be with management?

ADVANTAGES

My feeling is that you can be comfortable with the union, and there are distinct mutual advantages. I commend this kind of system to you because such a relationship will defuse the stress between management and labor, and between medicine and labor. It will allow the mission of the organization to continue without excessive losses that could result from extensive grievance hearings at all levels or, more importantly, from devastating strikes.

## CONCLUDING REMARKS

Jean Spencer Felton, M.D.

I shall present some areas in occupational stress which I feel need development. First, an effort to mitigate the stress which all of us have been hearing about and experiencing, I believe that the first-line foreman should be trained in handling stress. He is caught in the middle, getting pressure from above and below. The watchword is "Get the production out." He cannot be a Simon Legree and a humanitarian at the same time. I think that if we give him some techniques for living with that ambiguity, we will be doing a great deal better than if we were to train some of the top managers, which sometimes we are more inclined to do.

Second, I believe that we should prepare people for retirement much better than we do. There was a movement in the 1940's when we saw considerable pre-retirement counseling in industry. This program disappeared with the recession and never returned. A general foreman was in my office recently relating to me his retirement experience. He said, "I put 33 years into the yard here and you know what retirement meant? All they were concerned about was that I turned in the decal to my car. They didn't care a damn about anything else, while I was being pushed out into a completely different kind of existence." I believe that there has to be something done to preclude that kind of anxiety, that stress, which builds up before a person makes this tremendous change in his career.

Third, I believe that workers should be allowed to express their feelings of stress without penalty. As it is now, if anybody in the lower levels speaks up, he is dubbed a troublemaker. He is marked, will not be promoted, and will be penalized. I think that in the same way that the individual is allowed to request an OSHA compliance officer to come in, he should be allowed to express the difficulty that he is having on a job.

Fourth, I believe there should be a social worker-counselor as part of every medical department. I have been saying this for about 40 years, and I believe that today, with inflation and widespread social and economic problems, there is greater anxiety and stress. Counseling is needed and I think that a better job of counseling can be done if there is some kind of casework background.

Fifth, we are seeing a rise of occupational disease. We are reading about it in the papers every day. This disease potential is leading to a tremendous amount of anxiety. We in the medical department should be equipped to handle the anxiety of individuals who do not know if, or when, they may manifest full, flagrant evidence of a debilitating work-incurred illness.

Sixth, I believe there should be increased communication with every employee when he comes on the job as to really what the job consists of. Many work applicants are given false descriptions of the jobs they are seeking to fill. In a sense, they may join the Navy to see the world, but for the next four years may work in the fire rooms. Or they get a job in the plant that in no way resembles what they were told when they came to work. Whatever the illness potential is, whatever the hazards are, the individual should be made

aware of these at the beginning, and periodically thereafter. I believe this will reduce the stress level.

Seventh, I believe that physicians who get into the situations in which some of us are finding ourselves should be given a sense of epidemiology so that they see the stress among groups rather than just within the individual who walks into his office. They should be able to identify stress as it affects a unit of people. My personal feeling is that one inroad would be to build into the family practice residency some content of what the wage earner faces on the job.

Next, and I get this from some of my occupational therapy friends, I think one of the great deficits in our culture has been the lack of good vocational guidance for the child, and particularly for the handicapped youngster. Children might be taught to think in terms of what their needs are. They could be helped to imagine what kinds of vocations that they would be most comfortable in, and which would be most rewarding to them.

Last, I think that we need good cost-benefit studies. This is getting back to the point that several of our speakers made concerning evaluation. We don't have good studies because they are difficult to derive. A couple of supported programs have fallen because they were not able to derive adequate data.

These are the things I feel we should develop in order to deal constructively and preventively with occupational stress.



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